

A Call to Action: Scanners Under Scrutiny!

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April 1997



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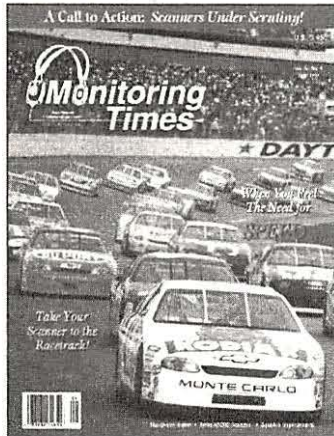
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Cover Story

When Scannists Feel the Need for Speed

By Mike Bryson

Wherever I look *everyone* is wearing headphones — and I know why: not only do they muffle the deafening roar of the souped-up stock cars, but when they are connected to a scanning receiver, they connect you to a whole new side of auto racing.

In NASCAR's Winston Cup series, the competition is intense, as the cars scream around the track bare inches apart at 180 miles per hour. Pit stops are measured in seconds, and team strategy can be critical to winning a race — just ask Jeff Gordon! Such coordination relies on radio.

Scanning strategy can make all the difference in how you view the race, as well. You are missing at least half the action if you can't hear what's going on between drivers and crew. Not to mention the stories going on out of sight on channels used by the media, security, and local agencies.

Load those frequencies now and bring your scanner to the race track — but leave the fried chicken at home. (Cover photo courtesy NASCAR)

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An MT Special Report

Privacy and the Public Airwaves

Bob Grove, publisher of *Monitoring Times* and president of Grove Enterprises, recently appeared before the House Subcommittee on Telecommunications at the invitation of chairman Billy Tauzin. He was hoping the opportunity would afford him a chance to clarify why the current listening law is flawed and why it protects neither the public's traditional freedoms nor its right to privacy. He believed the Subcommittee was interested in working on solutions.

From the outset, however, it became obvious that he was only a scapegoat. A choreographed demonstration by the cellular telephone industry representative and the subcommittee chairman soon made it clear the scanner listener (i.e., "electronic stalker") was to be blamed for the lack of security for wireless communications customers.



Who's "Stalking" Whom? 15



By Bob Grove

I thought testifying before Congress was an honor. Several concerned individuals had warned me beforehand that I had been set up for an ambush, but I still did not expect what followed. However, while Congress is paying attention, we must make our voices heard.

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"Is Anyone Listening? You Betcha!" 18

By Rachel Baughn

Though no one disputes the truth of the hearing's title, there is disagreement on who's to blame and what should be done. Excerpts from the industry and government representatives on the panel reveal where their true interests lie. What is likely to happen?

Making the Case for Scanning 22

MT has compiled advice from various sources on writing your representatives, along with questions and answers that may provide some persuasive arguments when speaking with non-radio legislators or acquaintances.

Following the Telecom Money Trail 25

By Larry Van Horn

We investigated the contributions from the telecommunications industry to the elected officials who participated in the subcommittee hearing. Though we've only scratched the surface, you don't want to miss this revealing report!



Reviews:

Our reviewers this month look at one receiver on its way in and another on its way out. Both are considered excellent values and both show good audio quality for their size.

New to the marketplace is the RELM HS-200 handheld scanner. Bob Parnass says, "The HS200 is not fancy but it has three important strengths: CTCSS and DCS decoding, outstanding performance, and affordability." See the rest of his review on page 94.

On its way out (at least in the U.S.) is the Sony ICF-SW600 midsize portable shortwave receiver. At \$60, this basic analog portable gives very good performance for the price. Magne says they are still to be found in many stores, though we struggled to even find a picture of it! You can find the review on page 93.



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Talkers vs. Stalkers?!

In an outpouring of indignation, scanner listeners from around the country and Canada have been writing to the media, their legislators, newsgroups, and they have been sending us copies of their arguments to counter the CTIA representation of scanner listeners as being "electronic stalkers." Canadian readers warn that their government is considering legislation as well.

An article by Craig Stolz in the Washington Post which characterized scanning as a "waste of human potential," also angered readers. Following are excerpts from some of the letters you have written. Perhaps they will help you compose your own protest letter!

Ed Muro's letter to his Representative:

"The average American is often outraged when they find out that their cellular calls can be monitored by a person with a so-called 'scanner.' ... For several years digital technology has been available that would virtually make it impossible for the average person to intercept such calls. Yet, the cellular industry interested in only one thing, profits, has not pushed for conversions to this digital system.

"A scanner is nothing more than a radio receiver. ... Several weeks ago I monitored the Space Shuttle while it was docked with the MIR Space Station, it was quite educational. ... the US Government ... pays for the National Weather Service to broadcast weather reports on 162.55 MHz... the kind of equipment used to monitor these reports is a scanner.

Some people confuse the devices I am talking about with ... a device that will capture cellular serial numbers so they can be cloned for fraudulent purposes. ... Anyone who participates in this kind of fraudulent activity should be prosecuted to the fullest extent of the law.

"... the airwaves have always been considered public domain. We have to ask ourselves some questions: Do we want to live an open society or a closed society? I believe the average American wants less government intrusion and this is what the framers of our constitution hoped for. Certainly cellular users are entitled to privacy. When law enforcement agencies want their radio communications to be private they encrypt them or use digital communications. The same should hold true for cellular telephones.

"Clearly there needs to be a balance between protecting the rights of cellular users and the rights of radio hobbyists. Violators of the ECPA should be prosecuted, but not at the expense of the average radio hobbyist."

Harold G. Peach Jr. letter to Rep. Tauzin

"I am writing to ask that the House Commerce Subcommittee on Telecommunications, Trade, and Consumer Protection draft legislation requiring that cellular telephone and PCS companies encrypt their transmissions, and that, in the interim, the companies implement mechanisms to warn the public when their conversations are being transmitted over unencrypted radio frequencies.

"Everyone knows that the radio spectrum is a public place and that communicating over radio is like shouting across a crowded room. No law can change this fact. However, the cellular companies have failed to implement reasonable measures to ensure my privacy — why you can even pick up cellular conversations

on a TV set! I have no reasonable expectation of privacy because of their negligence.

"I am both a cellular telephone user and a scanner owner, but I do not listen to cellular telephone conversations. The nation's 10 million scanner owners are not 'electronic stalkers' as portrayed by the Cellular Telephone Industry Association. ...

"The desperate attempts by the cellular and PCS industries to dodge their responsibilities will, I fear, lead to more ineffectual legislation that will help no one and harm an innocent group — scanner owners. Please do not be misled into thinking anti-scanner legislation or unencrypted digital communication will solve this problem. In a few years digital will be as common as analog is today and we will be right back at this same point. Only encryption can provide a reasonable degree of privacy in the public radio spectrum."

"If you thought America Online chat rooms were a shameful waste of human potential, just think about the folks who monitor the public airwaves with radio spectrum scanners."

— Craig Stolz in the Washington Post article "Scan You Dig It?"

Response from Kevin Carey

"I take great exception to your article ... implying that scanner monitors are a 'waste of human potential.' You, like so many others, appear to have fallen victim to the lies of the cellular industry. For your information, absolutely no attempt is made by cellular providers to encode their signals for privacy, even though it would be very inexpensive and logical to do so. Cellular signals are sent in the clear, using conventional FM transmission that can be received by many existing radio devices, including some older televisions.

"The cellular industry promised to explore some form of encoding over 10 years ago on the heels of ECPA-86, the Electronic Communications Privacy Act, which they rammed through Congress. To date, no progress has been made. Apparently, the industry finds it cheaper to point to the flimsy ECPA legislation as a 'guarantee' of privacy to customers.

"The overwhelming majority of scanner owners are responsible, contributing members of society who desire only to broaden their awareness of the happenings around them. This includes monitoring public service agencies, emergency communications, and other types of utility transmissions. In an age where apathy toward government and civic affairs runs rampant, why do you portray scanner owners as 'techno-creeps' with nothing better to do? Would you rather we

indulge ourselves in the sensationalism and spin tactics offered by today's 'infotainment' news centers?

"There have been many, many cases where scanner owners have been instrumental in solving (and preventing) serious crimes by promptly reporting information heard over the air to the authorities. Most police agencies, in fact, have a very positive view on the responsible use of scanners by the public. After all, why should they have anything to hide in their day-to-day operations?

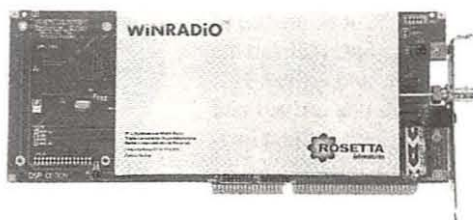
"Fact: Before ECPA-86 there had never been a law in America forbidding you to listen to something that is broadcast in the clear on normal radio frequencies. In Russia, and parts of Europe, yes, but never in America. Americans are now required to plug their ears if their radio or TV should stumble upon a cellular transmission. This ridiculous law has been unenforceable since its inception. Its only useful purpose is to serve the greedy needs of the cellular industry, who can hold it up as an 'assurance' of privacy to the uninformed public.

"I strongly encourage you to develop a more sound background in the technology and human factors behind radio monitoring before publishing further negative information about the absolutely legal hobby of owning and using a scanning radio receiver.

(Continued on page 102)

Dealers

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Monitoring Times, October 1996

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Chip, November 1996

"WINRADIO has enticing possibilities... The manual is an exciting book not only because of its beautiful cover, high quality paper, and easy instructions, but also because it contains a mix of operating and technical informations about various aspects of radio you might have forgotten or never knew."
World Scanner Report, Volume 6, No. 7

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800 MHz Mess

In Volusia County, Florida, the 800 MHz radio system shut down just as DeLand police officers were cornering a pair of armed robbers at a crowded shopping center. It remained inoperable for 10 minutes and then began delaying and dropping transmissions.

"It was a nightmare," said a source in the Deland Police Department. "Nobody knew what was going on." A quick-thinking communication supervisor switched back to its old radio system, which remains installed in patrol cars. Police later confronted and arrested the suspects.

According to reporters Brendan Smith and Matt Reed of the *Daytona Beach News-Journal*, "The \$16.2 million 800-MHz system has had problems since it was installed." Two municipalities have threatened to stop paying for their share of the system and Volusia County still hasn't legally "accepted" the Ericsson-General Electric ("We bring good things to life") equipment. County Council recently commissioned a \$60,000 study to determine if the county should give the system back. A decision is expected by the middle of this year.



Meanwhile, Memphis, Tennessee, has just received a new Astro 800 MHz digital radio system. The system includes 31 channels, 16 of which are dedicated to law enforcement. The balance have been handed out to fire and other city agencies. The Astro 800 system makes scanning impossible in this southern state and ends a tradition of cooperation between law enforcement and citizens.

Scanner Listener Saves Cop

A police officer in violence-plagued Washington, DC, has a scanner buff to thank for getting him out of a tight situation. Officers,

checking a report of a possible burglary, spooked three suspects who sped from the scene in an old, gray Toyota pick up. Police lost the vehicle, but an alert scanner listener, sitting in a convenience store parking lot, saw it speed by and followed. He notified police using his cell phone.

When an officer arrived, he approached the suspects with gun drawn, but when he tried to call for back up, he was unable to reach dispatch. The scanner buff realized the officer could be in trouble and called 911. Within three minutes, back ups arrived and the three suspects were arrested without incident.

Was the officer worried during the 8 to 10 minutes he was facing the trio with a dead radio? "It was cold out there and I'd like to believe I was shaking because of that." The officer added, in an understatement, "If [the scanner listener] hadn't done what he did, we wouldn't have gotten [the suspects]."

Copping the Old Cell Phone Plea

Police in Chicago who monitored cellular phone conversations in an effort to rescue a man from kidnappers in 1995 were commended by Judge Mary Maxwell Thomas for "an admirable display of fine police work...in an emergency situation." Nonetheless, Judge

Thomas has decided to suppress the majority of the prosecution's evidence against one of the kidnappers because of the "simple, yet blatant and egregious, failure, to obtain permission to listen to the calls."

According to reports, prosecutors now have to decide whether to appeal the ruling, and if not, whether to go forward with the case. One of the kidnappers was arrested when he appeared at the place where the ransom money was to be delivered.

Only a Few Wiretaps

Saying that unless the phone companies gave the federal government better access to the nation's phone systems, Assistant FBI Director James Kallstrom warned that "the criminal is going to have a huge leg-up on law enforcement." Kallstrom says that the federal government needs to be able to intercept some 60,000 lines across the country at any given time.

If the government gets what it wants, not to worry. Kallstrom said it would not mean substantially increased eavesdropping by federal law enforcement authorities. According to reports, he anticipates actually using only a minuscule percentage of those.

Stupidity 101?

Eight years after its controversial debut, Channel One, the classroom "news" program, is again under attack.

"Will you be testing us on the Nike commercial, Mrs. Roberts?"



According to a recent study by professors from Vassar College and John Hopkins University, the daily 12-minute program is light on news and heavy on advertising. Every day, Channel One is beamed into 12,000 schools nationwide.

Says Mark Miller, a media studies expert at Johns Hopkins, "The news is not the point of Channel One. It is no more than filler meant to prepare students for ads."

Miller titled his study, "How to Be Stupid: The Teachings of Channel One." The studies were coordinated by the group, Fairness and Accuracy in Reporting, a liberal media watchdog group based in New York.

Selective Vision

A CNN producer was suspended after airing footage of Ennis Cosby's body lying in a pool of blood next to his car. CNN president Tom Johnson reacted immediately, calling the video "a serious mistake." In addition to suspending the producer, Johnson said that CNN apologized to the Cosby family on the air, sent the family a personal letter of apology and pledged not to set up cameras in front of the Cosby house. Johnson said that he may extend the producer's suspension after he reviews the tape of the newscast.

TV and Cancer

According to an Australian study, there is a possible link between childhood leukemia and the radiation emitted from television transmission towers. University researchers say that children living in three Sydney areas near TV towers were almost two-and-a-half times more likely to die from leukemia than those in surrounding suburbs. The authors of the study, published in the *Medical Journal of Australia*, said that their work demonstrated an association but not a causal relationship.

"I can say that there is smoke," said author

Heather Grain, "but not what is causing the fire." The area of Sydney that showed the higher incidents of the kiddy cancer has been host to three television towers since 1956.

Rejecting Internet

If you're one of those people who can't wait for those new combination TV/Internet combos, you're in the minority. Despite the fact that use of the World Wide Web has doubled in the past year (according to a report by market researcher Dataquest, Inc.), a majority of U.S. consumers say they don't plan to buy the things. About 93 percent of the 7,000 people surveyed said that they were not interested in digital news, audio, and video piped in to their TVs from the Internet.

Zenith, Sony, and Philips are betting big money the survey is wrong.

Ham News

A new law in Guatemala has effectively abolished all ham bands between 2-meters and 6 mm in that Central American country. Already, the 70-cm (430-440 MHz) band has been declared available for commercial use. There is no change in Guatemala's HF allocations.

In the United States, *W5YI Report* says that ham radio has stopped growing and that, for the first time ever, "the combined census of Amateur Extra, Advanced, and General Class operators actually showed a decline last year."

The No Code Technician class continues to show the biggest increase in the number of ham operators. The American Radio Relay League has released a report claiming that ARRL members want to "keep the code." The report recommends "no changes in the treaty obligation that administrations test prospective amateur licensees on their Morse code ability before authorizing them to operate below 30 MHz."

We want to know, will packet operators also be required to take a speed test on their typing skills before being allowed to transmit?

More Sunspot News

Hold it — Didn't we just report on a nearly hysterical news item carried by newspapers around the country that warned of an upcoming, catastrophic sunspot cycle? The article warned of impending widespread communications blackouts, power failures, satellites blasted out of orbit, and even auroras appearing over the skies in Florida.

Now comes a report that the sun is entering

"a quiet period" that could mean a decade of "fewer power blackouts, less radio interference, and perhaps slightly cooler Earth temperatures." Scientists at Yale University and NASA predict that the solar cycle that began last September may be one of the quietest in more than 400 years, with only a moderate number of sunspots.

The last solar cycle, which began 11 years ago, was marked by some of the most violent activity — and best radio reception — ever recorded with peaks of 170 sunspots each in 1989 and 1991.

Of course, says NASA scientist Ken Schatten, if the centuries-old pattern continues, the upcoming cycle really could be even more violent than the last one. "Only time will tell if the forecast is correct."

Huh? Can sunspot cycles wreak the havoc reported in the earlier article? Scientists say, yes. In fact, some say that a very active sun during the 11th and 12th century thawed cool, northern areas of the globe and may have allowed Vikings to find and inhabit Greenland.

Yeah, but could they QSL St. Helena?

Touch Me, Fred

The Flintstones gave Springfield, Missouri, children the surprise of their lives recently. "You have to come in here and see this," one toddler told his mother. "Fred and Wilma are doing something weird on TV."

The "something weird" was that the local cable company somehow kept Flintstone's audio but instead of the cartoon characters, showed explicit video of a man and woman involved in steamy sex. "Yabba dabba doo," said Fred. The local cable station, testing a pornography channel it planned to offer subscribers, says they got their signals mixed.

"Gosh, Mom, come quick—Fred Flintstone is trying to kill Wilma!"



The glitch came at one o'clock in the afternoon on a day in which most southwest Missouri schools were closed because of bad weather.

Thanks to everyone who looked for, clipped out, and mailed in radio related newspaper clippings. Our 1997 team includes: Anonymous; Dave Alpert, New York, NY; Harry Baughn, Brasstown, NC; Michael Clean, Philadelphia, PA; Tad Cook; David Eason, Chevy Chase, MD; Bob Fraser, Cohasset, MA; Peter Hegan, Northern Ireland; Steven Gust, Mapleton, IA; Maryanne Kehoe, Atlanta, GA; High Miller; Rich Mosely, Wilkes-Barre, PA; John Murray, Woodside, NY; Ira Paul, Royal Oak, MI; Michael Roth, Chicago, IL; Simon Scheiner; Edward Schwartz, Chicago, IL; and Richard Sklar, Seattle, WA. We have also consulted the following publications: *National Scanning*, *Radio World*, and *W5YI Report*.

"Communications" is edited by Larry Miller.

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When Scannists Feel the Need for...



Photo Courtesy of NASCAR

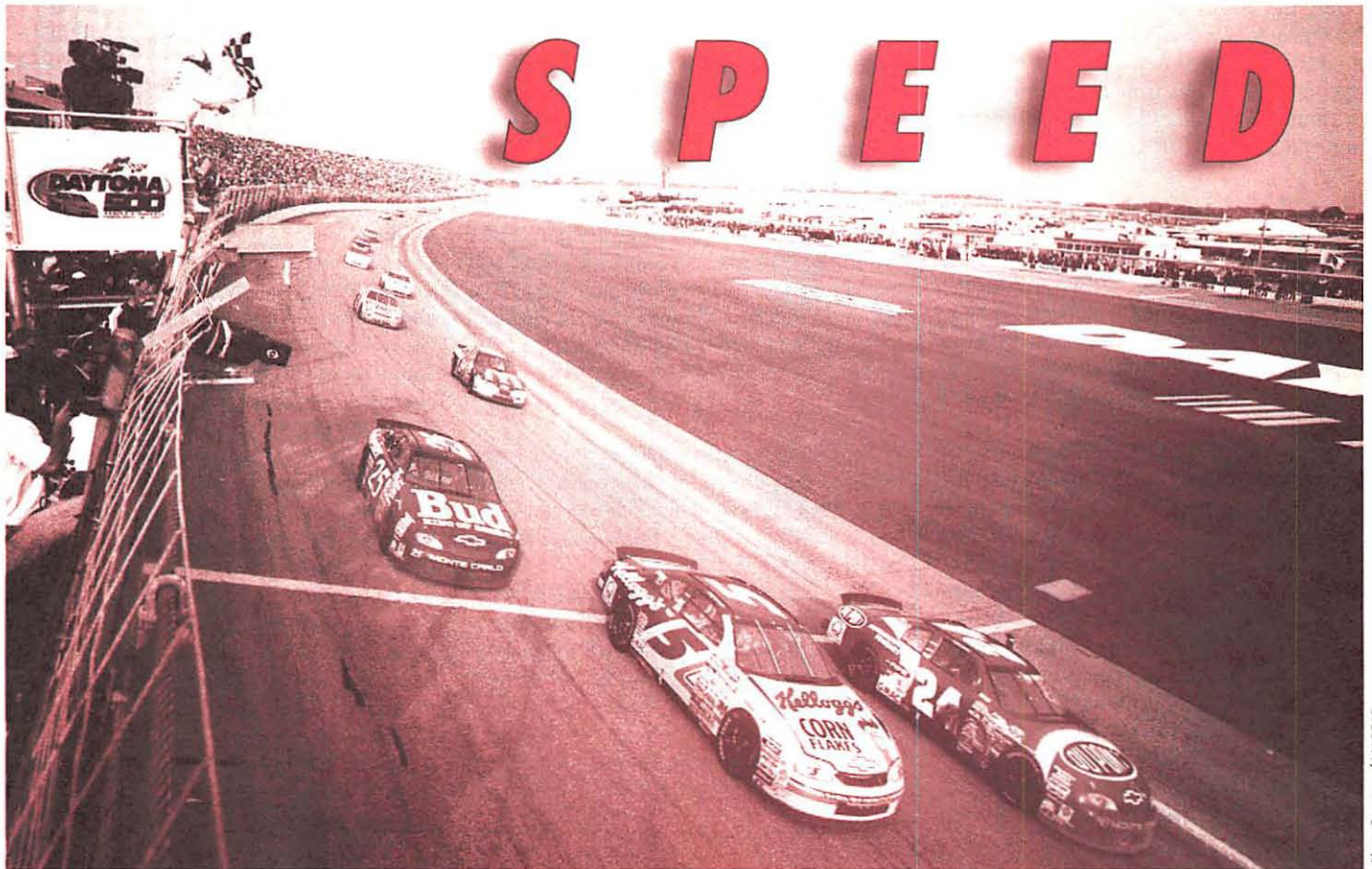


Photo Courtesy of NASCAR

They head to the racetracks, clutching the scanners which allow them to hear anxious exchanges between pit crews and drivers — and even between track officials and NASCAR safety crews.

By Mike Bryson

It is the first race of the season, and one of the biggest. This race begins the drive to see who will be the NASCAR Winston Cup Champion in 1997. The 1996 season was a close race with only a few points separating the two top point leaders. The grandstands here at Daytona International Speedway are packed with a record-breaking 170,000 or more racing fans eager to see the opening event. I am armed with the usual racing necessities to endure the four hour race ... a nice soft bench cushion, a cooler full of soft drinks, various eats, binoculars, camera ... and let's not forget my weapon of choice, a Pro43 scanner.

The folks on my right are enjoying the race with the aid of a pan of fried chicken and their Pro43. I trust they thought to program their scanner before digging into the homemade goodies. Otherwise that will make for some pretty slick fingerwork on the scanner. The folks on my left have some of my soft drinks (when you sit this close to someone, you had better be friendly!)

and their scanner, a Bearcat 200XLT. In fact, almost everyone I see has an eye to the racetrack and an ear to their scanning radio. What on earth are they listening to? ... Just some of the most competitive racing action in the country.

Two way radios are used in all types of auto racing to communicate between the driver of the car and the pit crew that works on the car during the race. That includes stock car racing, drag racing, Indy Racing League, Formula One, endurance, and all the rest. For this introductory article, though, we are going to focus on the biggest of the racing organizations today: the NASCAR Winston Cup series of 32 races

■ Double the action; double the fun

NASCAR (National Association of Stock Car Automobile Racing) is promoted as America's largest racing association, and it well could be. It was founded in the late 40's as a way to unite and standardize racing in the United States. This unification was done through stringent enforcement of rules and generous purses to the winners of the various races and championships.

NASCAR has a whole militia of technical inspectors to enforce their strict rules of competition. Bending of the rules is not taken lightly. Because of this NASCAR racing is some of the closest and most competitive racing you will ever see.

There are several divisions of NASCAR. The most elite is the Winston Cup Series — the cream of the corporate crop. There is nothing "stock" about a Winston Cup stock car except maybe the body panels of the car. It takes over a million dollars to put a car together for each season. And each team is outfitted with specialty cars for each of the various tracks that NASCAR tours around the country. No wonder these racers thank their sponsors every chance they get! It is estimated that over 5 million people attended the Winston Cup series races in 1996 alone.

■ Communications is the key to competition

The sport takes on a whole new dimension when you can not only see great action, but you actually tune into the drivers, pit crews, track officials, and even the NASCAR safety crews. All of these folks communicate via two way radio.

Because of the tight racing action and the duration of the races — typically 400 to 500 miles — drivers and their crews must stay in communication with each other. Crews have to keep in touch with the driver to inform him

Via two-way radio, the crew chief gives vital encouragement to the driver throughout the race, and pit stops are planned carefully in order to take as little time as necessary. Hearing it all on a scanner affords a new appreciation of the overall team effort.



Photos Courtesy of Jim Mennillo

of various developments during the race. Before the use of two-way radios was approved, the pit crew would hold up a placard with information or an instruction to come to the pit on the next round. Strategy could be decided when he came into the pit.

The length of the races makes it unavoidable that drivers will have to stop for fuel, tires, and sometimes even repairs. There is no such thing as a routine pit stop in NASCAR. Races can be won and lost by margins as little as a tenth of a second, so pitting strategies are a key factor in determining the outcome of race.

When every second counts, the advantage gained by the ability to plan pitting and racing strategies during the race are enormous. When the car enters the pit, the crew knows exactly what action needs to be taken to make the car perform better or to correct any problems that may have developed with the car during the race, without the need of additional, time-wasting conversation.

■ Uncensored

This level of competition creates some very urgent and often emotion-filled chatter between the driver and his crew. Having a

scanner handy gives a spectator an entirely different perspective on what it takes to win, or even run, in one of these tense, grueling races. Armed with a scanner and a good set of headphones you can certainly get an earful.

If you watch any of the races at home, you know that any time a driver is interviewed in front of the TV camera, it's the usual, sugar-coated, sponsor-filled sound bites — not that I blame them for the public relations plug for their team. But wouldn't you like to know what really happened? What really caused that crash? What are their real thoughts about their fellow drivers?

You can do this by simply tuning in on your scanner. That's where you'll hear the real thing, unpolished and unrehearsed. In one race, I was tuned into the race leader as he was passed by another competitor. On camera these two drivers have nothing but praise about each others' driving skills. But on my scanner I heard the race leader sarcastically remark back to his crew "he's pretty brave on new tires, we'll see how long *that* lasts." The race leader let the more aggressive driver go by him. ... It lasted about 10 laps.

Another time I again overheard a mild-mannered racer (when the TV camera is on) exclaim to his crew chief "he's pissing me off, Richard" because he was being blocked from passing a lapped car.

I also learned from listening in on the interchanges just how much the driver relies on his crew chief for guidance and inspiration during the race. Watching a professional driver thread his way through the pack with only inches to spare, one would assume he must be cool, calm, and collected. Not necessarily. These crew chiefs are constantly coaxing their anxious drivers throughout the race. "Okay, let's stay calm, you're doing fine. Stay focused. Stay focused."

I would hate to be *out* of focus going 180mph plus! I find it very understandable



Photo Courtesy of Mike Bryson

Radios are ubiquitous at the racetrack, and many scannists use headphones to subdue the noise. Many also wear headphones with integrated AM/FM radios to monitor the broadcast action.

why the driver sounds a little anxious at these speeds—but without my scanner, I would have missed part of the underlying drama.

■ Finding the frequencies

The average Winston Cup team has two or three frequencies from which to choose. These are usually in the 460 to 470 MHz range, but there are a few outside of this band in the 850 MHz range. Two or three teams now scramble their signals for privacy, but most of the teams still transmit unscrambled analog signals. The transmitting power for a team is typically between 2 to 4 watts.

You can get the specific frequencies for each team several ways. One is to buy a frequency list at the track for about \$5 to \$10. There are also several books that list sports-related frequencies such as *Beyond Police Call*, edited by Rich Barnett. Alternatively, if you have access to the Internet you can usually find frequencies of interest for NASCAR on several related sites such as the Winston www.nascar.com or various scanner newsgroups. You could also check out Grove's home page for MT's new listing of scanner frequencies for racing.

I recommend that you get your frequency

list and programming done before you get to the track (remember the folks with the fried chicken?). Check out Table 1 for the 1997 NASCAR Winston Cup Frequencies, courtesy of Speedworld (www.speedworld.com).

My favorite tool for getting the frequencies I want is to use the Grove Enterprises FCC Database (I gotta plug my sponsor too, ya know). With a little information

about the teams I am interested in, I can search this database and get any frequency assigned to them. For example, I know that several of the top teams are located in North Carolina. I also know the frequency band and the business names for the teams that I am interested in (Hendrick Motorsports, Richard Childress Racing, and Roush Racing). *Figure 1* shows the results of my search.

Don't forget to research frequencies for each individual race track that you will be visiting, as well as any relevant police, security, or emergency agency near the track. For instance, had I known that the traffic getting into this particular track was notorious for getting backed up, I would have found the appropriate Highway Patrol frequencies to consult so I could have avoided this mess!

Your alternative is to simply search for frequencies while at the track. I wouldn't recommend this unless you are a superb notetaker and don't mind listening to anonymous racers. The likelihood is that such blanket scanning will prove to be quite confusing, because it is difficult to identify the specific crews or drivers. No one gives any IDs here!

You can also rent scanners at the track that already have the frequencies programmed into them. Race Scan Communications (800-441-2841) is one company that will rent you a scanner for the day for about \$40. This is almost the cost of a low end scanner, but you are paying for the convenience of having the whole racing package available to you, including a pre-race broadcast. You do have to give the scanner back at the end of the day (dang, just when you were getting used to the thing).

■ Scanning sense

The racing action is always very close in NASCAR and there is always some very interesting and often revealing action to be heard on the airwaves. You can listen in to the communications of over 40 cars and crews competing at the track, but I suggest that unless you have a million channel per second scanner you just tune into the top drivers of the field — say the top 10 or so.

With my Pro43 I enter the driver's frequency in the channel corresponding to his car number. For the Winston Cup series, the numbers are all under three digits. For example, let's say a driver is known to have three channels available for transmitting. Normally he will only use one during the race. It's up to you to find which one he is using. If his number is 24, then I enter the first frequency on channel 24, the second frequency on channel 124, and the third on channel 224.

Once I determine which frequency he is using, I can then set up some kind of priority scan. This helps me keep things straight when the action starts to pick up. I can also set up special banks to scan so that I can hear more of the action without becoming confused what team I'm listening to. If you are lucky to have an alphanumeric scanner such as the AR 8000 or the new Icom R-10, you can enter the driver's name along with the corresponding frequency.

During a long race you will notice that the scanner chatter will settle down during long,

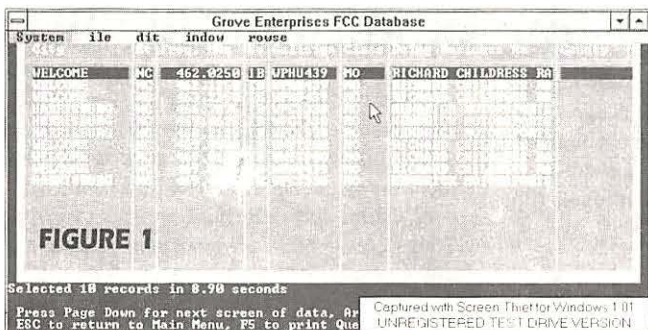


FIGURE 1
A screen capture from Grove's FCC Database, showing race drivers and frequencies.



Photo Courtesy of NASCAR

green flag (no wrecks) runs. Don't get discouraged. When a yellow flag drops due to accidents on the track, or if the leaders of the race decide to make a green flag pit stop, your scanner will jump to action like 42 different fire stations responding to a five-alarm fire. It can be overwhelming. I think it's just cool.

■ Hardware

There are several accessories that you will also need. A good set of earphones is a must. Trying to listen to your scanner at the race track without a set of earphones is practically impossible. Make sure that the headphones you are going to use will completely cover your ears. Walkman-type earphones are not adequate, because they cannot drown out the sound of over 40 roaring engines; rather than beefing up the volume, you must cut out the noise of the cars.

An extra set of batteries for your scanner is always wise. These races can last for up to four hours. The action really becomes frantic toward the end of the race in the final test of the drivers' skill and strategy. It can be very frustrating to be spend several hours listening in on the race only to have your batteries die on you before the conclusion.

I also take the antenna off of my scanner to help prevent strong, outside signals from causing a problem on my scanner. These same frequencies are used for restaurant drive through windows and various municipalities. For that reason, I would also recommend that you do not try to listen to the racing action at any distance from the track.

■ Winding down

The race here at Daytona has drawn to a dramatic finish, with Hendricks Motorsports making a clean sweep of the top three positions: Jeff Gordon emerged as winner, followed by teammates Terry LaBonte and Ricky Craven. My Pro43 has taken me behind the action into some interesting aspects of NASCAR racing. I was able to make more



Photo Courtesy of Jim Murrelle

In a very real sense, the performance of the pit crew can make or break a race, and radio communications are essential to the crews' efficiency.

sense out of this race, catch a glimpse of what it takes to keep a race car in contention for the win, and hear a more human side to the drivers and crews that make this sport work.

Although we have only focused on NASCAR in this article, there are many more racing organizations across the country. We'll be cov-

ering some of them in future editions of *Monitoring Times*, and we welcome your frequencies and tips as well. My best advice: Never go to a race without your scanner and a good frequency list—you'll be cheating yourself out of half the action. Oh, and one more tip: remember, don't freq and fry!

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Photo Courtesy of NASCAR

The Daytona 500 winner this year is Jeff Gordon, who exults here.

TABLE 1: 1996-1997 NASCAR Winston Cup and Media Frequencies


Photo Courtesy of Jim Moenle

WINSTON CUP SERIES VENUE FREQUENCIES (1997)

 Courtesy of Speedworld - <http://www.speedworld.net>

Charlotte Motor Speedway	462.5500	463.9000	466.1750	463.3500
Daytona Security	154.5150			
Daytona Traffic Copter	154.9500			
Dover Downs Int'l Speedway	463.4250			
Dover Security	463.9000			
Michigan Int'l Speedway	154.5700			
Michigan Int'l Spdwy Security	155.8650			
Michigan Int'l Spdwy Parking	151.8050			
Michigan Int'l Spdwy Hospital	155.2800			
New Hampshire Int'l Speedway	154.6000	151.6250	154.5700	
Phoenix Int'l Raceway	461.8125			
Richmond Int'l Raceway	464.5500			
Talladega Superspeedway	464.7625	464.7750		
Watkins Glen Int'l Speedway	464.7750	469.7750	464.1250	

DRIVERS AND CREWS

 Courtesy of Speedworld - <http://www.speedworld.net>

# DRIVER	PRIMARY	2ND	3RD
1 Morgan Shepherd	458.1625	466.1625	
2 Rusty Wallace	461.5875	461.3375	
3 Dale Earnhardt	469.0125	463.2250	462.0250
4 Sterling Marlin	461.7500	464.3000	464.3875
5 Terry Labonte	468.2125	469.4875	
6 Mark Martin	460.9500	468.5625	463.9250
7 Geoff Bodine	457.3750	457.1750	
8 Hut Stricklin	465.8875	466.0875	
9 Lake Speed		464.1750	463.9750
10 Ricky Rudd	465.7375	467.8875	466.2375
11 Brett Bodine	855.5125	855.5625	
15 Larry Pearson	457.5250	457.5500	466.5625
16 Ted Musgrave	468.4500		
17 Darrell Waltrip	469.3125	468.7625	469.1375
18 Bobby Labonte	467.7625	466.0125	
19 Loy Allen Jr.	467.1875	467.0000	
20 Greg Sacks	461.7875	461.8875	
21 Michael Waltrip	855.0375	855.2875	854.7875
22 Ward Burton	468.9375		
23 Jimmy Spencer	469.8375		
23 Team frequency	469.9375		
24 Jeff Gordon	467.0625	469.4875	
25 Ricky Craven	469.7875	466.4875	
26 Hermie Sadler	461.0875		
27	858.8375*	858.7875*	855.5625*
28 Ernie Irvan	466.9500	466.4500	
29 Robert Pressley	467.9625	466.4625	463.4000
30 Johnny Benson Jr.	466.3000	466.1250	469.0000
31 Mike Skinner	462.1250	466.9250	
33 Ken Schrader	468.7750	466.7375	
36 Derrike Cope	N/A		
37 Jeremy Mayfield	462.7125*	461.2875*	461.3625*
40 Robby Gordon	461.0000	463.9625	
41 Steve Grissom	459.3625	461.5625	461.3625
42 Joe Nemechek	460.9750		
43 Bobby Hamilton	468.3000	469.2000	
44 Kyle Petty	469.3000		
46 Wally Dallenbach	468.000		460.9750
71 Dave Marcis	467.5625		
75 Rick Mast	468.9750	461.9375	463.9750
77 Bobby Hillin	458.9750	459.8375	
78 Billy Standridge	454.2000		
81 Kenny Wallace	459.6875	459.2875	461.5625
88 Dale Jarrett	468.5250	466.3750	
90 Dick Trickle	467.1625		
91 Mike Wallace	460.1875		
94 Bill Elliott	469.8750	466.2250	
95 Gary Bradberry	463.5000	463.5750	
96 David Green	461.4750	464.8125	
97 Chad Little	463.4250		
98 John Andretti	468.7250	469.1500	
99 Jeff Burton	466.2750	466.8625	
NASCAR 1	469.5000	NASCAR 6	463.8500
NASCAR 2	464.5000	NASCAR 7	461.2000
NASCAR 3	464.9000	NASCAR 8	463.6250
NASCAR 4	464.7750	Scoring	468.2500
NASCAR 5	465.0250	Inspectors	468.8500
Goodyear Blimp	151.6250	161.6400	161.7000
	161.7600	132.0000	

NASCAR MEDIA FREQUENCIES (1996)

 Courtesy of Speedworld - <http://www.speedworld.net>

ESPN	450.3500	450.2500
TNN - The Nashville Network	467.9000	467.7500
CBS	153.2900	
MRN - Motor Racing Network	454.0000	
PRN - Performance Racing Network	161.6400	
Winston Cup Scene	465.9625	
Sports Channel	455.5500	

* = Scrambled

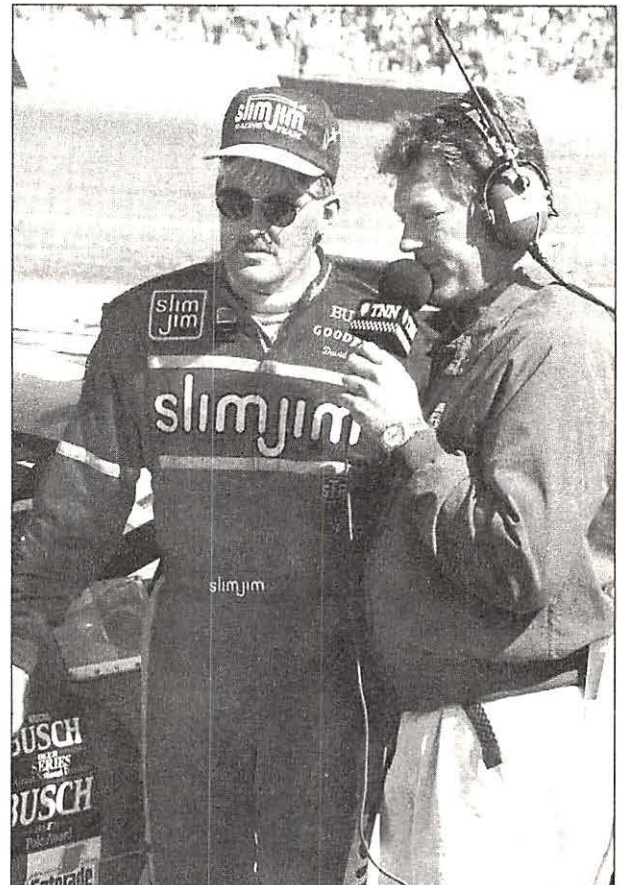
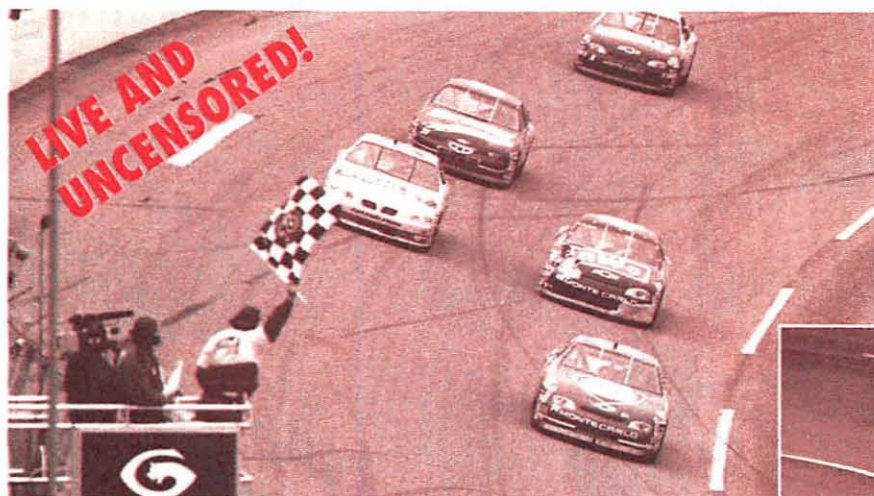
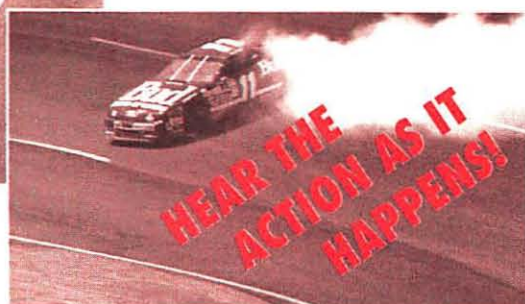


Photo Courtesy of Jim Moenle

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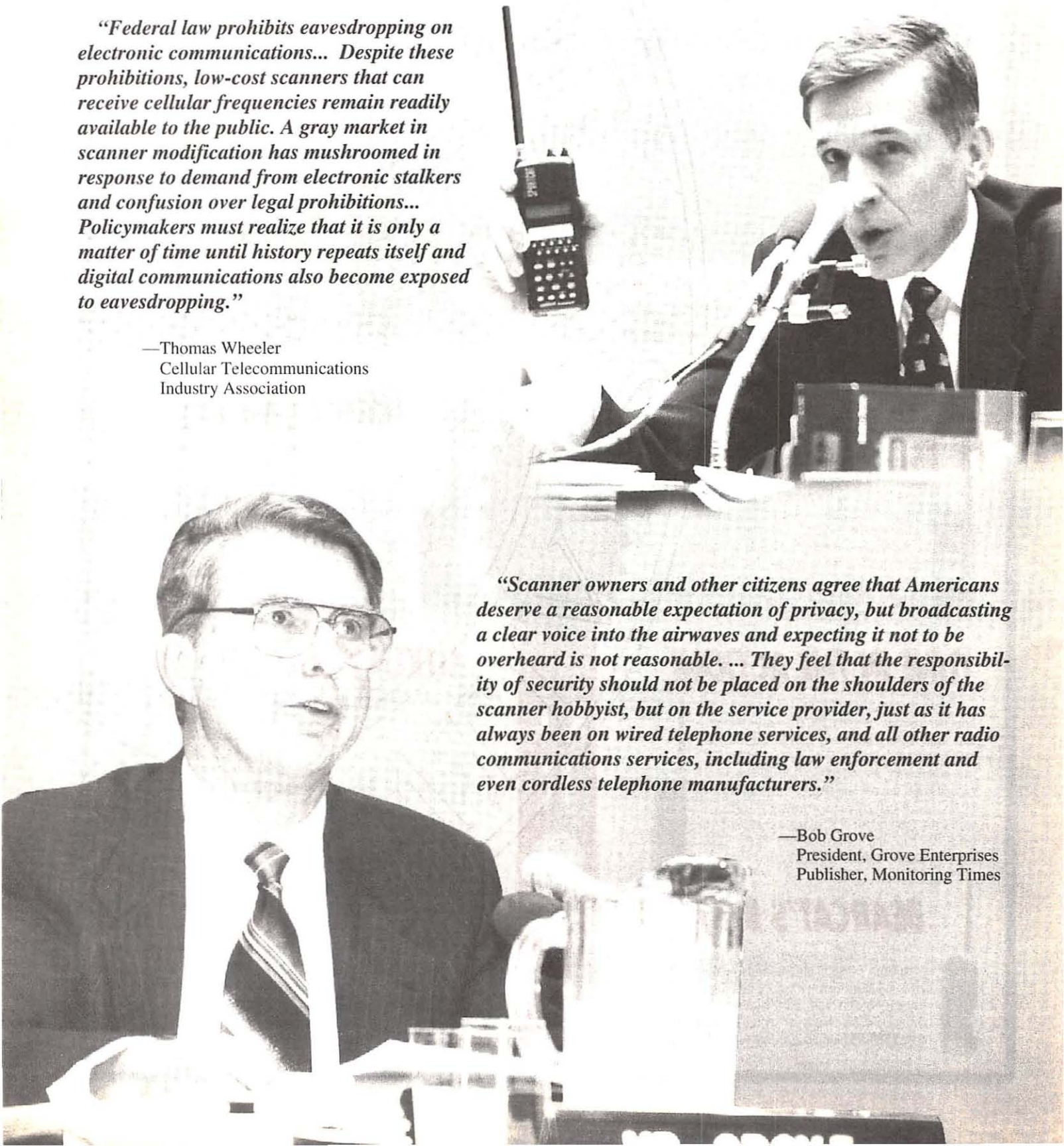
Privacy and the

"Federal law prohibits eavesdropping on electronic communications... Despite these prohibitions, low-cost scanners that can receive cellular frequencies remain readily available to the public. A gray market in scanner modification has mushroomed in response to demand from electronic stalkers and confusion over legal prohibitions... Policymakers must realize that it is only a matter of time until history repeats itself and digital communications also become exposed to eavesdropping."

—Thomas Wheeler
Cellular Telecommunications
Industry Association

"Scanner owners and other citizens agree that Americans deserve a reasonable expectation of privacy, but broadcasting a clear voice into the airwaves and expecting it not to be overheard is not reasonable. ... They feel that the responsibility of security should not be placed on the shoulders of the scanner hobbyist, but on the service provider, just as it has always been on wired telephone services, and all other radio communications services, including law enforcement and even cordless telephone manufacturers."

—Bob Grove
President, Grove Enterprises
Publisher, Monitoring Times



Public Airwaves

Who's "Stalking" Whom?

By Bob Grove
Photos by Alan Henney

It was an honor. I had been asked by Congressman Billy Tauzin, Chairman of the House Subcommittee on Telecommunications, Trade, and Consumer Protection, to appear as a member of a panel of industry leaders to provide information to members of Congress. It was an opportunity to be of service to my country, to make a difference. Although I had only one work day to prepare due to the short notice, I put off other pressing matters to devote full attention to assembling useful materials for these American statesmen.

For years, Congress has been relatively unconcerned with the effectiveness of anti-cellular scanning—until one of their own was caught red-handed. Following the Newt Gingrich cellphone incident, Congress ordered an immediate inquiry into the laws and technology surrounding scanners and their ability to listen in on private communications. I felt particularly qualified to give authoritative insight into the matter. Although I had lost much sleep to meet the deadline, I had prepared my comments carefully and comprehensively. I was ready.

As I walked into the spacious hearing room of the of the Rayburn House Office Building in Washington, DC, I was hushed by the echoes of history. Oil paintings of famous American statesmen smiled reassuringly down on me. Luxurious wood appointments filled the room with quality and warmth. Plush carpeting softened the din of TV cameras, microphones, and technicians as they prepared for the main event. Little did I suspect at that time, *I was to be the main event!*

■ Wednesday, February 5, 9:30 a.m.

It was show time. Some two dozen members of Congress began taking seats in the intimidating loft that looms over the witnesses. After the Chairman's opening remarks and perfunctory congratulations from the members, the panelists were allowed their opening remarks.

First heard was Tom Wheeler, President of the Cellular Telecommunications Indus-

MT SPECIAL REPORT



Grove's invitation to Washington was extended by Congressman Billy Tauzin, Chairman of the House Subcommittee on Telecommunications, Trade, and Consumer Protection.

Bob Grove was invited to Washington by a telephone call which went something like this:

"This is the House Telecommunications Subcommittee. We would like to invite you to testify at our hearing next Wednesday. We can't reimburse you for your expenses, nor can we provide you immunity from prosecution from your testimony. They might take you away in handcuffs afterward, and we'd like you to sign a waiver holding us harmless from any lawsuit. Would you like to come?"

"With a charming invitation like that," says Bob, "how could I refuse? Fortunately, I never signed the waiver."



This page from the Grove catalog was blown up to poster size and used as a demonstration of scanner modification practices by Grove and other companies.

try Association (CTIA), a powerful, Washington-based lobby. Wheeler and his associates had previously spent considerable time rehearsing his performance with the Chairman in anticipation of showing how easy it is to restore cellular frequencies in some currently-legal scanners. The performance was given again for TV viewers at the onset of the hearing.

Several concerned individuals had warned me beforehand that I had been set up for an ambush, and a high-ranking Congressman had told me that at least two members had been coached by the CTIA to take advantage of this public "photo op." But I still did not expect what followed.

In the midst of testimony, Wheeler suddenly reeled around, pointed his finger at me, and loudly denounced me for illegally modifying scanners for eavesdropping on cellular telephone calls. The tirade continued through the remainder of his five minute time allotment.

Though shaken by this unprofessional melodrama, I tried, by example, to restore decorum and dignity to the proceedings when called upon to deliver my five minute testimony. My other fellow panelists were apparently upset by Wheeler's contrived outburst as well, delivering their statements quickly and quietly.

■ Posturing for the Camera

Then the direct question period began; I was relieved, because now I would be able to answer specific concerns of the legislators—or so I thought. Instead, one after the other, Congressional Subcommittee members used their allotted time to denounce me, without directing specific questions for me for reply. Typical of the orchestration was the rant from Congresswoman Anna Eshoo of California: When I respectfully asked if I could answer her allegations, she succinctly replied, "No: I have five minutes!"

Massachusetts Congressman Ed Markey was clearly defensive of the FCC regulations which he authored and which I had dared question. When I attempted to explain an obvious oversight in his legislation, he rudely interrupted, "No, no, no," unsuccessfully try-

ing to find corroborating wording in his Rules and Regulations, and prohibiting me from continuing my testimony. It became terrifyingly clear; I had been set up by the cellular wolf PAC.

The droning continued, with my senses dulled by bright lights, disapproving glares, and sanctimonious accusations from the Subcommittee surrounding me, flashes from press cameras, nervous rustling from the audience; and all the while I was denied the right to defend myself from this bullying. Would I never awake from this bad dream? For the next two and a half hours these illustrious legislators took turns flogging me, and taking advantage of the limelight.

If I had been guilty of some crime perhaps I would have understood their indignation, but I had attempted to be in full compliance with FCC regulations, as attested to by official correspondence with the FCC ... which I was not allowed to present. I have always tried to be a good person, practicing kindness and equality, truly believing in the basic goodness of the human spirit. Now my character and my philosophies were completely denigrated; surely I must be a very bad person to be so universally scolded.

It may have been my ironic sense of humor that pulled me through. I kept thinking, "This is ridiculous!" I also recalled the tongue-in-cheek, faux-Latin expression, "Illegitimus non carborundum" (Don't let the bastards wear you down), and that helped, too!

One seasoned spectator said when we exited the chambers, "They can take everything but your integrity." In the midst of the profound inequity of the mockery, that singular statement is the one I remember. They hadn't taken my integrity, and that was an important lesson.

In retrospect, I would point out to Chairman Billy Tauzin that he needs to familiarize himself with the contents of the same document he sent me—the Rules of the House of Representatives (XI, k, 4 and 5)—which say:

"The chairman may punish breaches of order and decorum and of professional ethics on the part of counsel, by censure and exclusion from the hearings; and the committee may cite the offender to the House for contempt. Whenever it is asserted that the evidence or testimony at an investigatory hearing may tend to defame, degrade, or incriminate any person...(etc.)."

A prominent statesman, asked whether he would prefer testifying before a Congressional Committee or having a root canal, immediately replied, "I'll take the root canal!"

■ Epilogue

Since the Washington experience, my wife and family, my friends, and hundreds of supporters have been deluging me with warmth, admiration for my control under unthinkable conditions, and gratitude for a job well done. I am able to sleep well again, and have started the process of healing and catching up with neglected business.

Committee member: "I can hear as a matter of fact, someone else's phone call, not this phone call."

Tauzin: "No, you can't!"

(Interchange, producing laughter, during the staged demonstration of how easy it is to overhear a cellular call on a modified scanner. The wrong call was initially monitored.)

However, the experience and the expressions of support will go for naught if we don't pursue the matter and make our voices heard while the indignation is strong and the press and Congress are interested. It is for that reason we have dedicated nearly the entire feature section of this month's magazine to the issue of privacy versus public access to the airwaves. Yes, we've been listening—but are they?



A sign at committee's door hinted at the well-rehearsed scanner modification demonstration to be held within.



In a demonstration obviously fine-tuned in advance, Tauzin, assisted by Wheeler, shows how a simple circuit board modification can enable a particular scanner to receive signals in the cellular frequency range.

Scanners and the Law: A Chronology

1934 Congress passes the Communications Act, establishing the Federal Communications Commission (FCC), and includes the visionary Section 605 which addresses the inevitability of interception of radio signals, but prohibits the disclosure of the contents of such transmissions, or the use of their contents for personal gain.

1986 Congress passes the Electronic Communications Privacy Act (ECPA), for the first time censoring Americans' historic right to the airwaves by forbidding listening in on several types of radio signals, including the radio portion of a telephone conversation. The Cellular Telecommunications Industry Association (CTIA) issues public statements that it will soon offer digital encryption systems to provide their customers privacy. 11 years later, these privacy systems are only in an estimated 10-20% of the cellular market.

1989 Two prominent CTIA members, Uniden and Radio Shack, discontinue manufacturing several scanner models with cellular frequency coverage, although follow-on models are easily restorable. Other manufacturers continue to offer cellular frequency coverage since existing law forbids listening, not manufacture. Many companies perform cellular restoration at the time of sale so that the censored scanners will have the same frequency coverage as perfectly legal, competitive models. 1990 CTIA and the Telecommunications Industry Association (TIA) adopt the IS-54 standard for digital voice cellular encryption, called Time Division Multiple Access (TDMA). A secondary standard, Code Division Multiple Access (CDMA) is also proposed.

1992 President Clinton signs the Telephone Disclosure and Dispute Resolution Act (TDDRA), directing its implementation in 1994, but which contains no reference to radio scanners.

1993 The TDDRA is altered with a last-minute Cellular Amendment just before Congressional adjournment, allowing little legislative scrutiny, and averting public awareness or comment, but banning the importation or manufacture of scanners capable of receiving, or being readily altered to receive, cellular telephone frequencies. In response to an enormous outcry from concerned citizens, Bob Grove files formal commentary with the FCC and asks to give testimony to the House Subcommittee to cite 20 potentially disabling aspects of the Cellular Amendment to the pending TDDRA. Access to the Subcommittee is denied, but Grove is allowed to come to Washington to talk with a Congressional aide and leave his petition. No further response was forthcoming from the Subcommittee. Grove publishes for public comment the list in the magazine, *Monitoring Times*. Public response was considerable. The FCC issues Report to Congress on "Available Security Features For Providing Cellular Telephone Privacy," describing several voice encryption systems available to the cellular industry.

1994 Congress implements the TDDRA. Illinois Attorney General Roland Burris issues a formal opinion that, under Illinois state law, eavesdropping on cellular and cordless telephones is legal because there is "no reasonable expectation of privacy." CTIA issued a public objection.

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"Is Anyone Listening? You Betcha"

Oversight Hearing on Cellular Privacy: Studies in Vested Interest

Compiled by Rachel Baughn, editor

Why the sudden indignation at a relatively small number of basically harmless radio hobbyists? Did the issue really surface at this time only because of the publicity surrounding the intercepted cellular phone call between Newt Gingrich and fellow Republicans? Or are there other forces at work? Here is what Representative Bill Tauzin, chairman of the subcommittee, said in his opening remarks:

"A few weeks back some of our leading lawmakers learned the hard way that cellular calls are not as secure as we may like. This hearing is not about that particular case. But that case raised a lot of questions ... How readily available are scanners that can intercept wireless calls? ... Are digital cellular and personal communications services more secure? If so, when will these services be available nationwide? ... Will digital services become less secure as digital scanners come down in price...?"

Looking at testimony from the other panelists, it becomes obvious that, regardless of the initial impetus for the proceedings, there are a number of groups which have substantial vested interest in the outcome. Following are

some excerpts from the opening statements of the panelists who represented those groups. I wish to point out that some speakers departed substantially from their more restrained published testimonies from which these comments were taken.

It is also important to point out two other topics which were important to some panelists, but which will not be addressed here: that is, the growing resistance of many local governments to the proliferation of cellular towers (which the industry claims is necessary to the development of digital networks) and secondly, the degree of access allowed law enforcement to private communications, once secure encryption is in place.

Full transcripts of these opening statements are available on the Internet at <http://www.house.gov/commerce/telecom.html>

HONORABLE TOM BLILEY, CHAIRMAN COMMITTEE ON COMMERCE

"Cellular and other wireless services are a perfect example of the fruits of a private, competitive market. ... However, if, due to recent events, Americans have lessened confidence in the privacy of their cellular calls,

then this engine of economic growth ... could be derailed."

HONORABLE W.J. "BILLY" TAUZIN, CHAIRMAN SUBCOMMITTEE ON TELECOMMUNICATIONS, TRADE, AND CONSUMER PROTECTION

"The essence of a free society is freedom of speech. Open and unguarded discourse is a core freedom of a true democracy."

"The problems with wireless privacy appear to be the technical properties of analog communications and the wide availability of easily modified scanners. There is a problem in enforcement, with the expert agency, the FCC, referring potential criminal cases to other agencies that may have less interest in enforcing the anti-intercept laws ... In the meantime there are technical solutions that can enhance callers' privacy currently available at reasonable prices in the marketplace."

Panel I

THOMAS WHEELER, CELLULAR TELECOMMUNICATIONS INDUSTRY ASSOCIATION

"Federal law prohibits eavesdropping on electronic communications... Despite these prohibitions, low-cost scanners that can receive cellular frequencies remain readily available to the public. A gray market in scanner modification has mushroomed in response to demand from electronic stalkers and confusion over legal prohibitions... Extending protections or trying to ban a specific type of eavesdropping gear after it has already become widely available is difficult. ... policymakers must realize that it is only a matter of time until history repeats itself and digital communications also become exposed to eavesdropping."

BOB GROVE, PRESIDENT GROVE ENTERPRISES, PUBLISHER MONITORING TIMES

"Scanner owners and other citizens agree that Americans deserve a reasonable expectation of privacy, but broadcasting a clear voice into the airwaves and expecting it not to be overheard is not reasonable. ... They feel that the responsibility of security should not be placed on the shoulders of the scanner hobbyist, but on the service provider, just as it has



"The law has been playing catch-up with technology and the electronic stalkers have been successful in outmaneuvering the Congress's efforts. ... It is 100% legal... It is time for the electronic stalkers and those who cater to them to stop thumbing their nose at the Congress and trampling on individuals' rights."

—Wheeler

always been on wired telephone services, and all other radio communications services, including law enforcement and even cordless telephone manufacturers.

"Americans resent government repression of their rights, and freedom of the airwaves has been traditional for decades. ... If cellular telephone conversations were digitized as long promised by the cellular industry, all of these hearings, charges and countercharges, legislation and regulations, indictments and fines, and costly policing of the cellular frequencies...would be unnecessary. (See Closing Comments on p. 104 for full text.)

JAY KITCHEN, PRESIDENT PERSONAL COMMUNICATIONS INDUSTRY ASSOCIATION

"You face a difficult dilemma — how to protect a citizen's right to privacy without expanding federal regulation of the private sector. PCIA believes that personal communications services or "PCS" technology offers the solution you seek. ... We hope that our members are able to overcome the market and regulatory obstacles ... in order to deploy service to every American that would like to engage in a private telephone conversation."

GARY SHAPIRO, PRESIDENT CONSUMER ELECTRONICS MANUFACTURERS

"Scanners are popular products that contribute to public safety and communication. Scanner manufacturers recognize privacy concerns and are moving to try to stay ahead of those who make a business out of illegal interception of phone calls.

"The challenge we face is that no telephone conversations can ever be 100 percent secure. Most consumers understand this, especially for cellular conversations. Fortunately, technological advances, especially digital technology, will soon provide Americans added security and privacy. ... Digital encryption adds another level of security to all communications. We would encourage cellular service producers to consider employing this standard."

JERRY BERMAN, EXECUTIVE DIRECTOR CENTER FOR DEMOCRACY AND TECHNOLOGY

"In this context of a global communications network increasingly dependent on wireless links, we are able to see how it is a serious invasion of privacy to eavesdrop on cellular telephone conversations. ... As cellular telephones become more ubiquitous, cellular scanning threatens the privacy of all telephone users. ... it is clear that Congress made the right decision in 1986 when it determined that intentionally intercepting cellular phone conversations should be a federal crime. Con-

gress clearly has the authority to protect communications transmitted over the airwaves... We believe that the Congress should take a serious look at closing the ambiguities in the scanner law."

"Again, though, we are here to stress a broader point: The integrated, global, decentralized communications network is vulnerable to threats that make the interception of the Speaker's telephone conversation pale by comparison. ... Wireless communications should not be—and need not be—the weak

link in the integrated communications infrastructure. Strong encryption offers opportunities for enhanced security in the digital age."

Panel II

JAMES KALLSTROM, ASSISTANT DIRECTOR IN CHARGE, NY DIV, FEDERAL BUREAU OF INVESTIGATION

"Given that the FBI is a law enforcement investigative agency, and not a regulatory

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agency, we are not in the best position to comment on the security of current and future wireless telecommunications systems. Such comments are best addressed by telecommunications equipment manufacturers, individual wireless telecommunications carriers, and by the Federal Communications Commission (FCC)."

"It is unfortunate that there are a number of publications, trade magazines, and sites on the Internet where information is available concerning techniques and devices for conducting unauthorized, illegal interceptions ... Privacy and security are put at risk when this information is directed to the general public, as opposed to authorized law enforcement agencies and telecommunications carriers."

ROBERT LITT, DEPUTY ASSISTANT ATTORNEY GENERAL, CRIMINAL DIVISION, DEPARTMENT OF JUSTICE

"No one engaged in legal activities should have to fear that his or her telephone conversations are being surreptitiously listened to by others. ... To ensure that private conversations remain private, we need to rely upon both technical solutions and legal protections. ...

"To the extent that the radio portion of cellular communications can be easily intercepted, technical solutions may serve to best protect communications privacy."

**WILLIAM KENNARD, GENERAL COUNSEL
FEDERAL COMMUNICATIONS COMMISSION**

"...the [law] prohibits only scanners capable of intercepting cellular telephone calls. It does not regulate devices which intercept personal communications service (PCS), air-to-ground, or other over-the-air transmission services. ... [The Subcommittee] may wish to weigh the extent to which PCS and other over-the-air services should be accorded similar privacy protections.

"In response to Chairman Bliley's recent request, we are undertaking a thorough examination of our current scanning device authorization and enforcement processes to ascertain whether our rules and implementation efforts are as effective as they can be. If our review finds any areas where improvements can be made, you may be assured that we will make them."

Now What?

According to a high ranking member of the Subcommittee, the industry can expect more stringent laws to punish willful interceptors of protected communications, aggressive enforcement of present and future laws, heavier

"When 43 million subscribers pay their monthly fees for their cellular telephone they expect to have a certain degree of privacy, so we in Congress have the responsibility to protect them."

—Stearns



Rep. Cliff Stearns of Florida.

finer, civil as well as criminal penalties for infractions, and deletion of words like "surreptitious" and "primarily useful" from the present language of the laws, and the circuitry in scanners is likely to be "hardened" against frequency modification.

Indeed, several accommodations were apparently already in motion before this hearing took place: One prominent test receiver has been denied its application for certification as a consumer product until the manufacturer can prove it is incapable of receiving cellular frequencies. The FCC rejected an appeal by Ace Communications, which had been served a \$20,000 Notice of Apparent Liability (NAL) for marketing cellular-capable scanning receivers with no FCC authorization. Uniden has asked the FCC to impose a minimum 38 dB image rejection ratio for frequencies in the cellular bands, and is apparently discussing other solutions to prevent modification of scanners.

Grove Enterprises had voluntarily ceased performing modifications to restore cellular frequencies before the hearing, pending its outcome. Cellular Security, which performed various modifications, closed its doors completely. The FCC has now posted a clarification of any ambiguous wording (see Public

Notice, DA 97-334, Feb. 13th, 1997) that "modification of scanners on a substantial scale to receive cellular frequencies will be considered to constitute manufacture of such equipment in violation of FCC Rules. Entities engaged in such activity are cautioned to cease advertising and/or performing any such activity immediately." Indications are that those companies which have done so will not be fined.

We can expect a move to remove from scanners all frequencies that transmit wireline conversations—in other words, the radio portion of any device capable of communicating with a wired (and therefore protected) telephone. In addition, there is a very real potential that law enforcement influences will make a separate push to remove police frequencies from scanners.

It is imperative that we radio hobbyists write our Congressmen and let them know our side of the privacy issue vs. freedom of the airwaves. Let them know which solutions you expect them to support. Keep your eye on any proposed legislation coming out of this Subcommittee. Visit the Grove homepage for updates. See the accompanying sidebars to this article for more background and contact information.

Note on advertisement below: As of 4/26/94 it became unlawful to market cellular-capable receivers in the US. Atlantic Ham Radio assures us that it will give a full refund and hold customers harmless from shipping expenses if a purchased unit is returned to the vendor by US Customs.

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Making the Case for Scanning

Act Now to Counter the CTIA on "Capital" Hill

Although our dollar contributions may not count for much compared to those of industry, legislators still need our votes. It has been repeatedly proven that letters to senators and representatives *do* influence legislation, and senators and representatives *do* pay attention to their mail. That's why the cellular industry is also lobbying for letters from the public (see boxed ad). We must be as vocal as the non-scanning public who do not understand the underlying issues at stake.

Sending a letter is better than a phone call or e-mail for several reasons:

- Letters are hard evidence of constituent interest in a particular issue. Letters get answered more often than phone calls.
- Letters are easy to reference later.
- With letters, you don't have to rely on a third party to summarize your information.

Second best is a faxed letter. Send a fax if time is critical, or follow up a letter with a faxed paragraph on the eve of a vote. E-mail has gained some credibility, but the word is that the vast majority of legislators do not read their e-mail, or do not give them the same weight as a letter.

The more letters received, the better. Therefore, although your club president could write on behalf of the club, you will have more impact if it is reinforced with letters from as many individuals as possible.

■ Tips on Writing a Letter

The most effective letter is usually a personal one, although you needn't be too proud to steal ideas from other writers. Your tone must be polite; being classified as a crank will not help your cause, nor will sarcasm or insults.

Keep letters to one page. If a bill is the subject, cite it by name and number. In the first paragraph of your letter, make your topic clear, as well as your position on the issue.

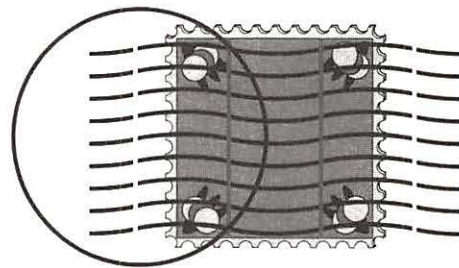
Stay with one topic. If you have

more than one topic, write multiple letters. When you write about more than one topic, it gives the legislator an option of responding to only one of your issues.

Next, back up your points with personal or factual information. For instance, explain how specific legislation would affect you and numerous other state residents if enacted. Avoid emotional philosophical arguments.

If you believe legislation is wrong and should be opposed, say so, indicate the likely adverse effects, and suggest a better approach. Be respectful when you disagree. You can still be firm, because as a constituent, you deserve answers.

At the beginning or end of your letter, tell



legislators specifically what you want them to do. For example, ask their position on a particular issue or request that they vote a certain way or cosponsor a bill.

If you don't get a clear response, write back and ask for one. For example, the following would be an unsatisfactory response from a legislator: "I will keep your thoughts in mind when voting on this important issue."

On the other hand, after receiving a reply, send a thank you letter. Be sure to write when you agree with your representative, as well as when you disagree. If you believe you have something in common, or admire a position or statement of the legislator—even on an issue unrelated to the immediate subject—say so.

It goes without saying that you must be sure your name and return address are clearly legible, and that you should check your letter carefully for spelling and grammar.

■ Writing to Congress

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Washington, DC 20515

Dear Representative _____

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YOUR CELLULAR PRIVACY IS OUR CONCERN.

ALLTEL Mobile and the CTIA (Cellular Telephone Industry Association) are totally committed to ensuring complete privacy for all cellular phone users. Together we are doing everything in our power to minimize the risk of eavesdropping on cellular telephone transmissions, and to toughen existing laws governing this offense. Intercepting cellular phone conversations is currently a violation of Federal and state law and we believe that anyone guilty of this crime should be prosecuted to the fullest extent of the law.

To aid us in making this crime less likely, and the punishment more severe, we urge all cellular phone users to write their congressional representative and express concerns about this important issue.

The cellular industry is mounting its own write-in campaign. This ad appeared in the Gainesville Sun, Feb. 08, 1997. Courtesy Todd L. Sherman, rec.radio.scanner.

■ Questions and Answers about Scanning and Cellular Frequencies

Why is it a mistaken notion that privacy can be achieved by carving out chunks of the radio spectrum and declaring them illegal to overhear? How do you begin to respond to non-radio friends, neighbors, media, and Congressmen who are understandably indignant when conversations they thought were private turn out not to be?

Following are some questions and answers that may provide some ammunition when explaining the hobbyist's view of the problem and more appropriate solutions. Also be sure you read this month's "Scanning Report" by Rich Barnett for some of the positive uses to which scanners have been put. The following text is taken from the rebuttal Bob Grove would have made to the subcommittee had he been allowed to speak, and from a helpful resource on "frequently asked questions" by Harold Peach Jr. of Kentucky; all are available for your use.

Regarding scanner modifications by Grove Enterprises

Q *Weren't you aware that modifying scanners is illegal?*

A On the contrary, we had good reason to believe it was legal. We have been in dialogue with the Federal Communications Commission for years relating to this issue. A letter drafted by the FCC October 30, 1995, was received by Grove Enterprises informing us that they had received a copy of our catalog and had several concerns, asking us to reply within 30 days to their specific questions regarding "apparent violations." We replied in only seven days, fully disclosing every aspect of our services relating to their questions, and assuring the Commission that we would discontinue these services immediately if we were found to be in violation.

We awaited their findings, but none was ever forthcoming. A subsequent telephone inquiry to the issuing official confirmed that our response was under study. Contrary to testimony by the FCC's witness, *no notice of liability, or cease and desist order, was ever received from the FCC.* A telephone call to the Commission following the hearing confirmed that such a notification was never sent. We logically assumed that we were not found to be in violation.

We advertised our cellular restoration service openly since we had no reason to believe we were in violation. When we were contacted by the House Telecommunications Subcommittee, expressing their concerns and inviting our representative testimony on Capitol Hill, we immediately suspended the cellular restoration service until the issue could be resolved.

After the hearing, prodded by the Congressional Subcommittee, the FCC sent us a letter acknowledging that we had discontinued our cellular restoration procedure, but notifying us that the procedure was in violation of the Rules and regulations, and that any future infraction could subject us to a fine.

Q *But isn't it clear from the Wiretap Act that modifying a scanner is illegal?*

A It is clear from the language that the Wiretap Act was drafted to protect Americans from unwarranted, targeted surveillance, and that casual monitoring of the spectrum by scanner hobbyists was not an issue. This is the reason that the law forbids the marketing of any device "primarily useful for the surreptitious interception of wire, oral, or electronic communications." Further wording describes the act as having to be "intentional" or "willful," indicating felonious purpose.

Q *Aren't devices capable of listening in on cellular telephone conversations illegal?*

A No. Cellular telephone calls are readily accessible to the public on: 1. Pre-1994 scanners and frequency converters which

remain lawful devices; 2. Currently manufactured, lawful scanners by image detection; 3. Older TV sets and VCRs that tune through UHF channel 83; 4. Test equipment like service monitors and spectrum analyzers; 5. Non-scanning (manually tuned and fixed frequency) receivers; 6. Home-built or kit scanners and converters (although none is marketed); 7. And even cellular telephones which can be keyboard-programmed to listen in on other subscribers' calls. Cellular service providers and government agencies, including volunteer fire departments, may legally purchase cellular-capable scanners for use by their agents and employees.

Q *Isn't it obvious that anyone wanting a cellular-capable scanner is going to use it to listen in on other people's conversations?*

A Besides individual citizens, our clients include government agencies, service providers, research and development labs, FCC-licensed radio services, and many other legitimate users of full-frequency-coverage receivers. Scanners are an excellent, low cost alternative to expensive test equipment.

Cellular-capable scanners are in full compliance with law when used for monitoring test signals in the cellular frequency ranges for new product development; determining whether cellular signals are the source of interference to other services; receiving non-voice cellular signals for antenna, filter, preamplifier, and other accessory testing; troubleshooting radio frequency systems in a communications maintenance and

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repair shop; and for receiving Part 15 (low power) signals which share the cellular frequency ranges.

Q *Aren't you simply looking for loopholes, flaunting the law for your own profit?*

A Grove Enterprises, after nearly two decades of service to the public, private, institutional, and government sectors, has earned a reputation for integrity. We would be foolish to jeopardize our respected and trusted image for a procedure which accounts for a tiny fraction of our business. This is the reason that we have maintained on-going dialogue with the FCC, have conducted periodic inquiry with the Department of Justice, and have voluntarily suspended our modification procedures indefinitely in deference to this hearing.

Some Q&As for the non-radio-hobbyist by Harold G. Peach, Jr.

Q *Isn't listening to radio communications, including cellular, an invasion of the participant's privacy?*

A No. The public's expectation of privacy when using unencrypted radios or cellular telephones is unrealistic and rooted in misconceptions about the nature of radio. Unlike wire and fiber optic mediums, which are privately owned and truly private, the radio spectrum is a public medium. Radio is public in that it is a public resource, like a park or street and, it is also public in that all activities carried out there are done so publicly. When people use commonly accepted methods of radio communication (whether analog or digital) that do not include encryption, there is no reasonable expectation of privacy. No law can change this fact. Communicating via radio is metaphorically the same as shouting across a crowded room.

Q *But don't the nation's telephone users have a right to privacy?*

A Yes. Callers have a reasonable expectation to privacy when using the telephone. However, when those telephone conversations move from private mediums to the public medium of radio, the nation's telephone companies have an

obligation to protect the content of those conversations through encryption. Only then does true privacy exist.

Q *How can congress act to ensure the privacy rights of the public are protected?*

A By passing legislation requiring telephone companies to encrypt wireless telephone communications. And, in the interim, by requiring that callers be warned when their privacy can not be ensured because their conversation will be traveling unencrypted over radio.

Q *Isn't encryption expensive?*

A Encryption is neither prohibitively expensive nor technically impractical. But even if encryption were not feasible, it does not change the fact that without it, radio communication privacy can not be expected.

Q *What good is encryption? Won't someone always be able to break any cipher invented?*

A It is true that for any technical method of concealing something there will always be someone who can break it, but this is a separate issue. When someone takes reasonable steps to encrypt their communication they have a reasonable expectation to privacy. When someone breaks that encryption and listens to the communication, they invade the person's privacy and violate existing laws—not because they intercepted the signal, but because they broke an encrypted communication to which they were not a party. Metaphorically, this is equivalent to holding a glass to the wall or opening some else's mail.

Q *Even if we acknowledge that encryption is the best solution, isn't banning scanners a simpler way to solve the problem?*

A Scanners are radio receivers that can be programmed to listen for activity on several frequencies. Even if outlawed, it does not require an engineering degree or a high degree of electronic knowledge to build a radio receiver, so we should never assume outlawing their

manufacture or sale will prevent people from obtaining them. Even a television set can receive cellular telephone calls!

But the question misses the point. Banning radio receivers to prevent the monitoring of radio communications is metaphorically equivalent to requiring people to ignore a public conversation taking place before them. Common sense tells you this won't work.

Q *Aren't radio hobbyists really just high tech voyeurs, eavesdroppers, or, as the Cellular Telephone Industry Association has called them, "electronic stalkers?"*

A No. Is it unethical to listen to two people yelling at each other across a crowded room? Is it voyeurism to observe the signals of a coach at a ball game? Radio hobbyists are ordinary people sitting on the sidelines of the public radio spectrum, watching and listening to the events unfolding before them.

Q *If the radio spectrum is truly public, why do we have licensing and auctions?*

A The Federal Communications Commission only licenses radio transmitters, not receivers. It does this to ensure the orderly use of a limited resource—the radio spectrum. However, neither licenses nor spectrum auctions convey ownership of a frequency or band, they only convey permission to transmit over the resource.

Reception of radio signals does not interfere with the orderly use of a frequency or band, so no licensing is required. Restrictions on radio reception traditionally occur only in countries with repressive forms of government.

Q *Do radio hobbyists support the Electronic Communications Privacy Act?*

A The ECPA protects many forms of communication from unauthorized eavesdropping. Everyone agrees with its provisions involving private mediums such as wire or fiber optic cable. It is only the radio provisions of the act, included as a "paper tiger" to primarily benefit the cellular telephone industry, that most radio hobbyists consider a bad and potentially dangerous law.

Following the Telecom Money Trail

Industry Sweetens Congressional Campaign Chests to Tune of \$10 Million

By Larry Van Horn

Political campaign finance reform has been a hot button issue in the news lately. The campaign finance woes of the Clinton White House are being aired nightly on the national's network newscasts. Congress is now calling for investigations of the White House misdeeds, but will this venue finally enact the proper legislation needed to stop the millions of dollars in soft and hard campaign contributions from special interest and political action committees (PACs)?

Let's peek inside the world of congressional campaign financing by following the money trail in the case of the February 5, 1997, house subcommittee hearing on cellular privacy issues discussed in this feature section of *MT*. You be the judge!

We visited a non-partisan Federal candidate campaign money page on the internet at <http://www.tray.com> and did a little research of our own. Here is what we uncovered.

While this subcommittee consists of 29 members from both parties, only 14 members spoke on camera (C-Span) during the hearings. We looked at the contributions from the cellular/telecommunications industry as a whole and from the Cellular Telecommunications Industry Association (CTIA—a Washington PAC) in particular, to each of these elected officials during the last 1995-1996 election campaign. These are the results of that research. The FEC (Federal Election Commission) identification number follows the Representative's name. Figures in parenthesis are the total campaign contributions accepted from PAC organizations.

**Rep. Rick White R-WA Incumbent
(H4WA01142)**

Telecomm industry campaign contributions:
\$93,744.00 (\$740,976.00)
CTIA campaign contributions: \$7,805.00

**Rep. Thomas Jerome Bliley, Jr. R-VA
Incumbent (H0VA03025)
Chairman of the House Commerce
Committee**

Telecomm industry campaign contributions:
\$72,037.00 (\$701,772.00)
CTIA campaign contributions: \$1,000.00



**Members of The House Subcommittee
on Telecommunications, Trade &
Consumer Protection
(Ratio: 16-13)**

*W.J. "Billy" Tauzin, Louisiana, Chairman

*Michael G. Oxley, Ohio
Vice Chairman

Dan Schaefer, Colorado

*Joe Barton, Texas

J. Dennis Hastert, Illinois

Fred Upton, Michigan

*Cliff Stearns, Florida

*Paul E. Gillmor, Ohio

Scott L. Klug, Wisconsin

*Christopher Cox, California

Nathan Deal, Georgia

Steve Largent, Oklahoma

*Rick White, Washington

James E. Rogan, California

*John Shimkus, Illinois

*Tom Bliley, Virginia (Ex Officio)

*Edward J. Markey, Massachusetts

Rick Boucher, Virginia

Bart Gordon, Tennessee

*Anna G. Eshoo, California

Eliot L. Engel, New York

Albert R. Wynn, Maryland

Thomas J. Manton, New York

Bobby L. Rush, Illinois

*Ron Klink, Pennsylvania

*Thomas C. Sawyer, Ohio

*Gene Green, Texas

Karen McCarthy, Missouri

John D. Dingell, Michigan (Ex Officio)

The Committee on Commerce
2125 Rayburn House Office Building
Washington, DC 20515
(202) 225-2927
Commerce@mail.house.gov

*Present at the Feb. 5 hearing

**Rep. W.J. "Billy" Tauzin R-LA Incumbent
(H0LA03018)**

**Chairman of the subcommittee on
Telecommunications, Trade and
Consumer Protection**

Telecomm industry campaign contributions:
\$58,922.00 (\$544,150.00)
CTIA campaign contributions: \$750.00

**Rep. Joe Linus Barton R-TX Incumbent
(H4TX06117)**

Telecomm industry campaign contributions:
\$45,250.00 (\$636,030.00)
CTIA campaign contributions: \$500.00

**Rep. Michael G. Oxley R-OH Incumbent
(H2OH04032)**

**Vice Chairman of the subcommittee on
Telecommunications, Trade and
Consumer Protection**

Telecomm industry campaign contributions:
\$40,584.00 (\$428,885.00)
CTIA campaign contributions: \$2,800.00

**Rep. Clifford B. Stearns R-FL Incumbent
(H8FL06056)**

Telecomm industry campaign contributions:
\$30,480.00 (\$328,176.00)
CTIA campaign contributions: \$500.00

**Rep. Christopher Cox R-CA Incumbent
(H8CA40057)**

Telecomm industry campaign contributions:
\$30,123.00 (\$396,315.00)
CTIA campaign contributions: \$250.00

**Rep. Anna Eshoo R-CA Incumbent
(H8CA12096)**

Telecomm industry campaign contributions:
\$25,178.00 (\$245,265.00)
CTIA campaign contributions: \$1250.00

**Rep. Paul E. Gillmor R-OH Incumbent
(H8OH05044)**

Telecomm industry campaign contributions:
\$24,950.00 (\$262,083.00)

**Rep. Ronald P. Klink D-PA Incumbent
(H2PA04093)**

Telecomm industry campaign contributions:
\$19,150.00 (\$319,575.00)

Rep. John Mondy Shimkus R-IL
Elected to Open Seat (H2IL20042)
Telecomm industry campaign contribu-
tions: \$16,450.00 (\$199,289.00)

Rep. Thomas C. Sawyer D-OH
Incumbent (H6OH14040)
Telecomm industry campaign contribu-
tions: \$5,500.00 (\$307,575.00)

Rep. Raymond Eugene "Gene" Green
D-TX Incumbent (H2TX29030)
Telecomm industry campaign contribu-
tions: \$5,500.00 (\$394,494.00)

The final member of the subcommittee that testified during the hearing was Rep. Edward John Markey D-MA Incumbent (H6MA07101). Congressman Markey was the author of the Telephone Disclosure and



Dispute Resolution Act that stipulates that after April 26, 1994, no manufacturer can make in the U.S., or export to the U.S., scanning receivers or frequency converters that are designed, or can be readily altered, to receive cellular telephone frequencies.

While congressman Markey only took \$500 from PAC organizations during the last campaign, an analysis of contributions to the "Markey for Congress Committee" by individuals (\$654,547) was truly enlightening. Sixty-seven percent of his campaign contributions came from out of state. \$69,800 came from individuals in the cellular/telecommunications industry. This included \$3,200 in contributions from members of the CTIA. That total included a personal contribution of \$1,000 by CTIA President, Mr. Thomas Wheeler, who testified at the subcommittee hearing on behalf of the cellular lobby.

The CTIA donated a total of \$73,188.00 to congressional campaigns in 1995-1996. The 14 members mentioned above received \$18,570.00 total from the CTIA.

Campaign contributions from the entire cellular/telecom industry to the 14 members of the subcommittee mentioned above totaled \$593,790.00 during the last election, while total contributions to all campaigns in 1995-1996 from the industry as a whole totaled over a whopping \$10 million.

In a 1994 interview by the *Cyberwire Dispatch*, a lobbyist for one of the regional telephone companies was quoted as saying, "If you want me to tell you that our money buys us a vote on a particular bill at a particular time, I say @#\$%, it doesn't."

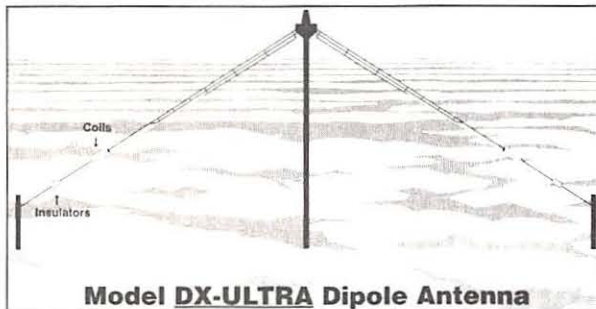
"However, if you ask me, 'Do we get better access because of a couple of \$1,000 checks?' I'll guarantee you that two grand gets us in the door and gets our telephone calls returned before Joe Blow from the home office," he said. "And it sure as hell gets our calls returned before yours."

Now I have to wonder what \$10 million buys? A darn good House subcommittee hearing maybe?

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Fingers in the Spectrum Pie

The Federal Communications Commission may become even busier selling the airwaves if the proposed White House fiscal 1998 budget is approved. The Clinton Administration wants to balance the budget by raising more than \$36 billion from auctioning large blocks of spectrum now occupied by television broadcasters and others.

The White House proposals include raising more than \$18 billion dollars by selling television spectrum now used by TV broadcasters, including UHF channels 60-69 (to be made available by transitioning to high-definition digital television). The FCC would be granted additional authority to sell spectrum not used by TV broadcasters, bringing in an expected \$17 billion. Another \$700 million would be garnered by auctioning toll-free 888 numbers.

■ FCC Auctions

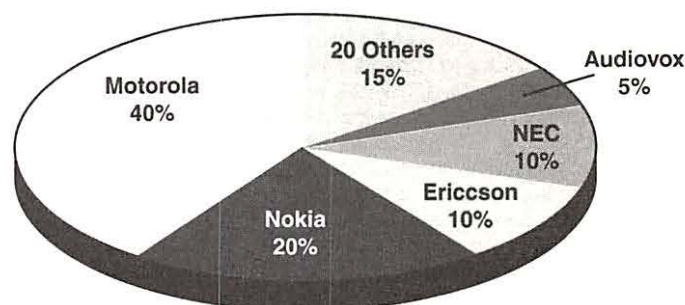
Since beginning auction proceedings in 1994, the FCC has raised almost \$23 billion dollars, with the bulk of that coming from Personal Communications Services (PCS) licenses. Other auctions sold space for satellite and wireless cable television and unserved cellular areas, as well as other services. However, the high prices paid for space in the early auctions may not carry over into future FCC efforts, if the most recent auction is any indication.

In January the FCC closed bidding on the final group of licenses in the D, E, and F broadband PCS bands. At stake were three licenses for 10 MHz of spectrum in each of 493 markets. A total of 125 companies won the 1479 licenses, bidding a total of \$2.5 billion.

The most expensive market was New York, with bids of \$184.7 million. Runners-up were Chicago with \$146 million and Los Angeles with \$74 million. Sprint was the biggest spender, laying out more than \$544 million for 160 licenses (almost \$8 per person in the license areas), including Chicago, Atlanta, and Cleveland. AT&T spent almost \$407 million for 222 licenses that include New York, Los Angeles, and Dallas.

Despite these numbers, this auction raised only about one-fifth of the amount generated by the previous C-block auction, probably due

CELLULAR PHONE MARKET SHARE



to the smaller 10 MHz spectrum slices (rather than 30 MHz), and a more realistic picture of what the licenses are actually worth. Conventional wisdom has it that previous auction bids were far too high.

■ Yet Another New Wireless Service

Under direction from Congress, the FCC in November released a Notice of Proposed Rule Making (NPRM) in which they proposed creating a "Wireless Communications Service" (WCS) to operate at 2305-2320 MHz and 2345-2360 MHz. Auctions to award licenses for these frequencies would begin no later than April 15, 1997, with the proceeds to be placed in the U.S. Treasury no later than September 30, 1997.

The FCC is seeking comments on a number of implementation issues, including appropriate channel sizes and how best to partition the spectrum geographically. Should channels be paired, with corresponding frequencies in the lower and upper band, or should each stand alone? Are 5 MHz channels wide enough for future services, or is 10 or even 30 MHz more appropriate? Is the PCS model of 51 Major Trading Areas the most efficient way to divide service areas, or should larger, regional areas be granted under a single license?

Also, current rules limit cellular, PCS, and Specialized Mobile Radio (SMR) service providers to a maximum of 45 MHz of spectrum in a geographic area. The FCC is considering whether to waive this competitive limit for WCS, since existing providers may have the most experience and expertise in getting services up and running. Keep in mind that the NPRM process is open to the public, and the FCC welcomes thoughtful, well-reasoned input. See the FCC website at www.fcc.gov for more information if you'd like to provide your opinion.

The proposed service would allow licensees to provide almost any type of fixed or mobile service, being limited in most respects only in the amount of interference to adjacent bands. One of those protected frequencies is the National Aeronautics and Space Administration's (NASA) Deep Space Network operation at Fort Irwin, California. Large, high gain antennas listen to very low level, deep space probe telemetry in the 2290-2300 MHz band. Other close-by allocations include satellite Digital Audio Radio Service (DARS) at 2320-2345 MHz and government telemetry above 2360 MHz.

FCC AUCTIONS

Service	Number of Licenses	Revenue in Millions
Nationwide Narrowband PCS	10	650
Interactive and Video Data Services	594	249
Regional Narrowband PCS	30	395
Broadband PCS (A and B Blocks)	99	7,736
Broadband PCS (C block) and reauction	493	10,174
Multipoint Distribution Service	493	216
900 MHz Specialized Mobile Radio	1020	213
Digital Broadcasting Service (110°)	1	683
Digital Broadcasting Service (148°)	1	52
Broadband PCS D, E, and F Blocks	1472	2517
Cellular Unserved	14	2
TOTAL	4227	22887

■ PCS Service Providers

With their recent license acquisitions, Sprint PCS has announced they are now able to provide seamless US coverage with a single technology. When the auctions began it was unknown if a single PCS operator would win a sufficient number of licenses to provide nationwide coverage. In the event that no single provider won out, a series of patchwork agreements would have to be established between different providers in order for subscribers to have full service everywhere in the country.

This "roaming" problem is compounded by the fact that the two main competing technologies, Code Division Multiple Access (CDMA) and PCS-1900, are incompatible. Providers have typically selected one technology over the other, thus excluding the other from operating over their system.

Sprint PCS, a joint venture of Sprint Corporation, Tele-Communications, Inc., Cox Communications, Inc., and Comcast Corporation, has access to licenses covering areas with an aggregate population of more than 260 million people. Those licenses didn't come cheap and the expenditures are just beginning, since over the next three years Sprint PCS estimates they'll spend \$1.5 billion for buildout of their network. Sprint PCS will utilize CDMA technology with Sony/Qualcomm handsets combined with Lucent and Northern Telecom base station equipment.

Another CDMA operator making a big splash is PrimeCo Personal Communications L.P., a partnership between AirTouch Communications, Inc., Bell Atlantic Corporation, Nynex Corporation, and US West Media Group. Sixteen months after spending \$1.1 billion for 11 PCS licenses, PrimeCo has rolled out service in 15 major cities using base station equipment from Motorola's Cellular Infrastructure Group and Lucent Technologies. Subscribers will initially use handsets made by Sony under license from Qualcomm, Inc., and will have access to such services as caller ID, call waiting, and short message service (SMS) for small text messages. Sony is currently producing an estimated 200,000 phones per month from their plant in San Diego.

Other PCS providers are trying to address the roaming problem by working together. BellSouth Mobility DCS, Omnipoint, Pacific Bell Mobile Services, and Western Wireless (parent of Voicestream Wireless) have agreements in place to allow any of their customers to roam in each other's territory. Five states were initially affected by this agreement: Bell South Mobility in parts of North Carolina and Tennessee, Omnipoint in New York City, Pacific Bell Mobile Services in San Diego, and Western Wireless in Honolulu. Sprint Spectrum users based in the Washington, D.C., area may also operate in these areas, and more than a dozen additional markets are currently operating compatible systems.

Each of these providers has chosen to implement PCS-1900, the GSM standard operating at PCS frequencies. GSM provider licenses now cover more than 260 million people in the United States, or more than 98% of the population. At the end of 1996 there were more than 200,000 PCS-1900 customers, and estimates place the number of GSM-standard customers worldwide at 150 million by the year 2000, which would represent half of all wireless subscribers.

Is this kind of growth realistic? In 1993 there were 13.5 million cellular subscribers. In 1995 ten million new customers signed up, and another nine million joined in 1996, bringing the total to almost 37 million subscribers. Projections place anywhere from 52 to 67 million cellular subscribers active by 2000. Surveys report the primary reason people get cellular service is safety, but many customers are finding the ease and convenience of portable communications too useful to ignore.

■ Future Phones

With new digital systems coming on line, voice is no longer the only draw for consumers. So-called "smart phones" are giving mobile users access to faxes, electronic mail, and even some Internet services. Current and proposed products will include voice recorders for answering machine and memo functions, touch screens, and built-in handwriting recognition.

Almost 15,000 smart phones are expected to be sold in the United States in 1997, with that number growing to 2.4 million by the year 2000. Since August of 1996 Nokia has shipped more than 100,000 of their handheld 9000 product, which combines a GSM phone, organizer, and palmtop computer. While currently available in Europe, it is expected to be available in the United States later this year. Other manufacturers, including some not previously in the wireless communications market, are looking to produce integrated digital products for the 15 million PCS subscribers predicted to exist in the year 2000. This should radically alter the market share of current handset producers.

Another trend expected to continue is the "one-stop shopping" for communications services. Providers will offer voice, data, Internet access, long distance service, local and nationwide paging, 800 number service, and even cable television, all under one bill. Some companies are expected to focus on a geographic area, clustering their services to customers with whom they already do business, such as BellSouth is doing in the southeastern United States. This process, also referred to as "maximizing the value chain," provides traditionally distinct but related services under a single brand name. It also allows profits from established areas to subsidize the startup and development of new services, and flexible discounting in highly competitive markets.

■ If You Can't Beat 'Em, Join 'Em

In an interesting marketing coup, not all providers advertising under the PCS banner are actually running at 1.9 GHz frequencies. Bell Atlantic Nynex Mobile (BANM) has introduced their "DigitalChoice" service, which is CDMA operating in the same frequency bands as traditional analog cellular. Capitalizing on their existing frequency allocations and base stations, BANM claims PCS is an accurate term for their service because they now offer caller ID and short text paging—features typically found on the all-digital PCS systems.

AT&T has been more aggressive, touting the availability of their "Digital PCS" system in more than 40 cities, again with the digital features PCS operators are advertising. In reality it is a Time Division Multiple Access (TDMA) system operating at the standard 800 MHz frequencies, having short-cut the normal 12- to 18- month PCS buildout period by simply upgrading existing base stations.

Customers of these networks typically purchase dual-mode phones, which operate in digital mode when in range of the new services, but revert to analog in areas that have not been upgraded. There have been some complaints about voice quality under the 800 MHz digital systems, and since service using a digital phone is often priced lower than with a pure analog phone, some customers have taken to purchasing a digital phone but getting better voice quality by setting it to always operate in analog mode.

As usual, more information is available on the PCS Front Line website at www.grove.net/~dan, and I welcome comments and questions at dan@decode.com. Until next month, happy monitoring!

In Defense of Scanning

The recent brouhaha over scanners and telephone (ahem), "stalking," has soured a portion of the public on the radio hobby. Try as we might to express the great positive aspects of scanning, lobbyists and legislators alike fail to appreciate or acknowledge the benefits scanners have brought us.

Let's review some of the more salient, positive aspects of scanner use.

A) Law Enforcement



Scanners are used not only by the public to listen to public safety agency communications; the agencies themselves use them. (Photo by Les Butler)

Scanners are used in thousands of police cruisers across our nation. In Massachusetts alone, almost every State Police patrol car is equipped with a Bearcat 760 or comparable scanner. The scanners are used by the State Police to stay informed of important police events in the local communities in which they also patrol. Police across the nation are able to provide assistance to neighboring communities as a result of in-cruiser scanner monitoring.

Some claim that this information could be passed on to neighboring communities via intercity channels and console patches. While frequencies are generally available for one town to call another when assistance is required, dispatch centers are often undermanned and resources often under-utilized. Even when calls for assistance are broadcast over intercity channels, a county, state or neighboring agency will be far more ready to respond, or already on their way, when they have been monitoring a fluid situation on their scanner.

If scanners were not sold to the public, they would not be made available for the relatively small market of police agencies, and public safety would suffer mightily.

B) Volunteer Firefighters/EMS

Volunteer and call firefighters provide a vital, low-cost service to

our society. The number of these community-spirited individuals has been dwindling, we're sorry to say, as the growing pressures of family and work have limited the time available to volunteers. This is why it's all the more important that essential information be provided to firefighters, whether volunteer, call, or off-duty. Yes, pagers are widely used to alert fire personnel to incidents, but a radio, particularly a mobile radio used when driving to a fire station or fire scene, has unparalleled value.

Preparation, response time, advance knowledge of the situation.....all of these a scanner can provide.

C) Emergency Management/Tornado Watch

Last year this editor went tornado-chasing with Weather Channel staffers. It was an absolutely incredible time, filled with radios, and I hope to write about this experience in an upcoming issue. (I also hope to go chasing again this year.) One of the things I learned on the trip was that, in the tornado belt, radio and scanners can play a critical role in warning the citizenry of impending disaster. When a line of severe thunderstorms rolls across the plains, warning alarms sound and radio chatter increases, as county sheriffs and local police coordinate their efforts to inform the public. Nothing was more fascinating and informative than listening to those scanner reports.

D) Public Safety Cross-Patch

Cross-patching is an old method of communicating, but it's still practiced in rural areas across the country. (Some may quibble with the name, as it is known by different handles.) Here's how cross-



Remember Hurricane Andrew that destroyed Homestead AFB? Scanners are an indispensable tool during a disaster. (Photo by Bob Wyman)



patching can work: A rural dispatch center needs to speak with a neighboring dispatch center, but they have no common frequencies on which to communicate. This occurs oftentimes when the rural centers are separated by a state border and have no common regional intercity police or fire channel.

What the dispatch center will do in this circumstance is to broadcast a call to the neighboring dispatcher, using one of its standard channels. The neighboring center will monitor its cross-state or cross-county colleague on a police scanner, and will reply to the call using one of its own standard police or fire channels. The first center will likewise receive the answer on its scanner. It seems antediluvian, but it works! Once again, scanners become an integral part of communications.

The national common police frequency, 155.475 MHz, has helped to alleviate this problem, but it is still not universally used.

E) Other Dispatch Center Uses

Many dispatch centers use scanners to keep abreast of ongoing public safety activity in neighboring communities. While direct radio ties may be available to these centers for intercity communications, personnel in the center often wish to stay tuned to conditions in adjacent municipalities and counties on an ongoing basis.

F) News Media

How the news media makes use of scanners is obvious: it's the way they learn of many local stories such as fires, water-main breaks, major accidents, and the like. Scanners are used by newspaper, radio, and TV assignment desk editors, and by reporters and cameramen in the field. Some cities also rely upon the pager services which are run primarily by fire buffs who monitor their own scanners and page-out news of important events for all who subscribe. Either way, scanners are essential to the process.

In one northeastern state, a battle has been raging between the news media and the State Police. The media wants access to the State Police trunked radio system, as it is so burdensome to try to monitor a trunked system with a scanner. The State Police, however, have refused to provide, or even sell, trunking radios to the media, as they are concerned about the integrity of their system. They're worried that someone in the media might accidentally transmit on the system or somehow download software code from one radio and program up another.

We are aware of similar issues between the media and law enforcement in other areas of the country. Some agencies will sell very expensive two-way equipment that can only monitor certain patrol talkgroups that have been pre-approved by the police and fire departments. It's cumbersome and costly.

The new Uniden TrunkTracker scanner will resolve many of these problems. Public safety agencies are pleased that they will not need to continue to battle, and perhaps end up in court, with the news media. Newspapers, radio, and television stations will be able to monitor without impinging on the integrity of their communications. They'll be able to get the stories they need. Scanners, particularly in this instance, have made everyone happy.

G) Community Groups/Personal Safety

Crime is a major concern of most Americans. We are fortunate, though, that in our society we have the ability to acquire knowledge, understand, and react to crime. One way we do this is through watching the news or reading the paper. Another way we do it is by listening to a scanner. Perhaps the most pro-active way we can

become involved, and help "take a bite out of crime," is by participating in Community Watch groups. These civilian groups patrol neighborhoods in coordination with the police and provide a visible deterrent to criminals who thrive on stealth.

Gene Hughes, the editor of *Police Call*, has been very involved in citizen awareness work in the Los Angeles area. Working in tandem with the LAPD, Gene advises citizens who have been the victims of crime, as well as apartment and community groups interested in better protecting themselves against any criminal threat, particularly home invasion.

Of the reams of information Gene provides, one piece of advice stands out: a scanner will help keep you informed of criminal activity in your area. Gene's not saying this because he's a scanner buff who writes frequency guides. He believes in it, and he's made believers out of many grateful L.A. residents.

H) An Aware and Informed Populace

As we've stated numerous times in this column, scanners help keep citizens informed as to crime and emergencies in their area. People who scan stay on the lookout for stolen cars and other criminal activity and report to police when appropriate.

But what scanners also do is to help us keep an ear and an eye on the day-to-day activities of our public servants. We rarely hear anyone who monitors police, fire and local government services finding fault with the job any of these professionals are performing. On the contrary, monitoring gives us a sense of pride, community, and "oneness" with the people whose salaries we help to pay and who work for our safety and protection day and night.

What This All Means

We must express to our national and state legislators, our state and local public safety officials, our friends, neighbors, and anyone else who will listen, that scanners serve the public good. While a few may misuse the technology, the overwhelming benefit scanners provide must not be overshadowed and could hardly be overstated.

Let's try to keep a running commentary on how scanners benefit us all. We look to you, *MT* readers, to mail or e-mail us your experiences and your thoughts, or newspaper articles about how scanners helped our public servants. We must rally together and not be railroaded by those with special interests or who exhibit inexplicable ignorance.

.....

■ End of Winter Antenna Check

Winter should be just about over for most of us by the time this issue arrives at your door. Here in Massachusetts the winter, as of mid-February, has been amazingly snow-free. Elsewhere in the nation—particularly in the northwest and upper midwest—the winter of '97 has been brutal. The insidious nature of snow and ice can cause a slow degradation in solder joints, as well as antenna and coax connections. If you have outside antennas—and I hope everyone has at least considered putting up an outside antenna for greatly improved reception and performance—check to see how your tower, mast, coax, antennas, and all connections made it through the winter months. Check to see if any water has penetrated into connections, tighten any beam, vertical, or ground-plane antenna elements that may have come loose. Re-seal connections and replace tired coax.

If you have the opportunity while you're up there, try a new beam or maybe a preamp (items we've discussed at length in previous

editions). You'll discover a whole new world of distance monitoring with improved, or new, antennas. As always, make sure your tower or roof is free and clear of snow, ice or other debris before climbing. Stay away from power lines and have a friend assist you on the ground.

■ Another Loss for the Hobby

Tony Mirabelli, formerly Uniden Vice President for Marketing and one of the most influential people in scanners, has moved on to new challenges. In late January of this year, Tony announced his resignation to the Uniden staff in Fort Worth. Tony was a key man in new product planning at Uniden. He provided strategic development of such products as TrunkTracker, the Sportcat, and BearTracker radios. Tony also oversaw product management for CB's, radar detectors, cellular phones, marine radios, and other lines. Perhaps his most significant achievement was in helping to achieve the explosive growth in Uniden's cordless phone category.

Now, in his new position as Senior Vice President for Marketing and Sales at Cobra, Tony will undoubtedly help that consumer electronics company grow and prosper as well.

Personally speaking, working with Tony was one of the best experiences of my life. He appreciated the knowledge outside consultants can provide and he utilized their talents to help create better products. He taught everyone he worked with how to get things done. Though he will be missed, I'm sure the team at Uniden will continue to develop new, exciting and affordable scanners for the hobbyist and professional alike.

■ The Future of our Spectrum

A February 12, 1997, editorial in the *Wall Street Journal* by James Gattuso, a Vice President with the Citizens for a Sound Economy Foundation, discussed FCC Commissioner Reed Hundt's "commitment to a market-based approach to regulating radio spectrum." Apparently, Mr. Hundt's FCC colleagues disagreed with his interest in auctioning off spectrum currently being utilized by land-mobile users such as business, public safety, land transportation, etc. Mr. Gattuso was editorializing for Mr. Hundt's approach, which would include providing law enforcement and other public safety agencies money (if we understand the story correctly), to place bids in the spectrum auction.

The rush for money fails to address issues such as interference and spectrum availability for necessary or important uses, not to mention the expense of moving frequencies and purchasing new equipment to small businesses as well as to government agencies. This is the trend, however, and there's no telling what the long-term impact will be for scanning.

Take a look at all those reasons at the top of this article why scanners are so invaluable: Perhaps these reasons, including public safety and public awareness, do pale in comparison to making a few billion more off one of our most important natural resources.

■ Rally to Raleigh

Here's some interesting mail from Raleigh, North Carolina, from Marshall Sherard (KE4ZNR). "I am a proud member of the Triangle Area Scanner/Shortwave group here in Raleigh. I wanted to invite you and the readers in for a frequency exchange! I have included the Raleigh Police information for publication. If anyone needs anything else for this area, just E-mail me at KE4ZNR@aol.com."

Raleigh Police Department Information

Frequency	User
460.150	Raleigh 1 - Citywide Dispatch
460.225	Raleigh 2 - South Status
460.250	Raleigh 3 - North Status
460.350	Raleigh 4 - Information (vehicle and person)
460.500	Raleigh 5 - Wake County small towns
460.325	Raleigh 6 - Car-to-car, rprr
460.025	Raleigh 7 - Car-to-car, rprr
460.200	Raleigh 8 - Special Events
	Raleigh 9 - 12 simplex versions of 460.150, 460.325, 460.025, 460.200
460.525	Garner Police Dept. - Ch. 1 (Ch. 2 simplex)
453.325	Garner Public Works (Police Dept. - Ch. 3)
461.100	Garner Senior High School - principals - simplex

Raleigh Police Dept. Codes and Signals

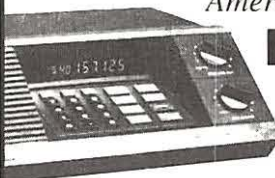
Status Codes	Time and Number Status
1 Transport subject	A Report made
2 Lunch	B Arrest or citation
3 Flat tire	C Completed assignment
4 Serving warrant	D Warrant advised
5 Phone	E Unable to locate incident
6 Vehicle repairs	F Unable to locate complainant
7 Radio repairs	G Ordinance enforced
8 Meeting unit	H Warned
9 Coffee break	I Referred to other agency
10 Stopping vehicle	J Unfounded
11 Tow-in	L Investigation
12 Out to District Court	M Pick up animal
13 Out to Superior Court	N No further action
14 Out to court	X False alarm
15 Writing report	
16 Out to station	
17 Investigation	
18 Security check	
19 Out to court	
20 Other	

Raleigh Signals

6	Phone
7	Meet
8	Any item not wanted known over radio
13	Conviction or revocation
14	Suspension or revocation
26	Computer down
35	Breaking and entering
44	Burglar alarm
45	Disturbance
65	Robbery
66	Rape
67	Overdose (also known as "Ocean-David")
68	Suicide
69	Larceny
75	Careless and reckless (C&R) driver
86	Person down
100	All units report location
101	Shots fired
102	Shooting
103	Homicide
1000	Assume roadblock post
2000	Alert status
3000	All units report in
4000	National Guard called out.
"Chapter 90" refers to ANY illegal drug.	
Compiled by Marshall Sherard, KE4ZNR	

America's #1 Scanning Magazine is

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Bearcat intercepts trunked radio

COMMUNICATIONS ELECTRONICS INC.

New...radios available from CEI

For over 28 years, thousands of radio operators have depended on police radio scanners, digital voice loggers, Ham/CB/GMRS transceivers, weather forecasting equipment and more from Communications Electronics. To get your free fax catalog, call 313-663-8888 from the telephone handset on your fax machine and follow recorded voice prompts.

Trunk Tracking

Conventional scanning is a simple concept. You enter a radio frequency into your scanner that is used by someone you want to monitor. For example, the police may broadcast on 155.370 MHz, the fire department on 154.250 MHz, emergency management on 158.760 MHz, etc. So when your scanner stopped on a frequency, you usually knew who it was and, more importantly, you could stop on the frequency and listen to an entire conversation. This type of conventional scanning was easy and fun.

As the demand for public communications increased, many public radio users didn't have enough frequencies to meet their needs, which created a serious problem. Trunking systems solved this problem. Since very few, if any, radio users really broadcast on their frequencies all the time, it was possible to use available public service bands much more efficiently.

In a trunked radio system, which contains between 3 and 29 different frequencies, radio users are assigned to talk groups, each with a specific ID number. When someone in a talk group uses their radio, subaudible identification information is broadcast along with each transmission. The trunking system computer uses this subaudible information to temporarily assign each radio in a talk group to an available frequency. If the group using a frequency stops broadcasting or pauses between replies for a few seconds, they are removed from the frequency so another talk group can use it.

Sharing the available public service frequencies allowed cities, counties, states and other agencies to accommodate hundreds of users with relatively few frequencies. On the other hand, following a conversation on a trunked system became difficult if not impossible because if the conversation you were listening to stopped transmitting long enough, it could be assigned a completely different frequency in the trunking system. This type of scanning was difficult and frustrating.

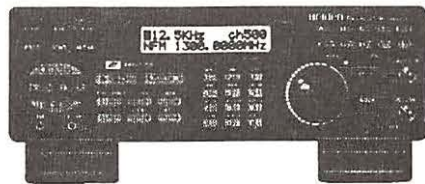
The Bearcat 235XLT TrunkTracker available from Communications Electronics changes all that. Not only does the Bearcat 235XLT search frequencies like conventional scanners, it can also follow the users of a trunked radio system. Once you know a talk group's ID, you won't miss any of the action. Order today. Call 1-800-USA-SCAN.

Bearcat® 235XLT-A TrunkTracker

Mfg. suggested list price \$429.95/CEI price \$269.95
Allow 30-90 days for delivery after receipt of order due to the high demand for this product. Call 1-800-USA-SCAN to order.
300 Channels • 10 banks • Trunk Scan and Scan Lists
Trunk Lockout • Trunk Delay • Extra battery & charger
10 Priority Channels • Programmed Service Search
Size: 2-1/2" Wide x 1-3/4" Deep x 6" High

Frequency Coverage:
29,000-54,000 MHz, 108-174 MHz, 406-512 MHz, 800-823.995 MHz, 849.0125-868.995 MHz, 894.0125-956.000 MHz.

The Bearcat TrunkTracker BC235XLT is the world's first scanner capable of tracking a selected radio transmission as it moves across a trunked radio system. Now it's easy to monitor fleets and subfrequencies in analog trunked radio systems. The BC235XLT can also work as a conventional scanner. This 300-channel, program-a-bank handheld scanner provides scanner users with uninterrupted monitoring capabilities of Type I, II, III and hybrid trunking systems. One of the biggest obstacles in the scanner industry has been the increasing use of trunking radio systems in business and public service agencies throughout the United States and Canada. This makes it nearly impossible to track a conversation as it moves within a trunk system from frequency to frequency. According to Ken Ascher, WB8LIT, Chairman & CEO of Communications Electronics, "The Bearcat 235XLT is a revolutionary breakthrough in scanner technology. Now it's easy to continuously monitor conversations even though the message is switching frequencies." The BC235XLT comes with AC adapter, CR120 battery charger, two rechargeable long life Ni-cad battery packs, belt clip, flexible rubber antenna, earphone, owner's manual and one year limited Uniden warranty. Not compatible with ESAS, EDACS and LTR systems. Call 1-800-USA-SCAN to order now.

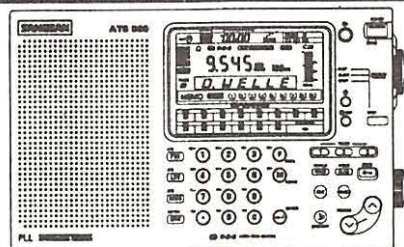


Bearcat® 9000XLT-A Radio Scanner

Mfg. suggested list price \$769.95/Special \$344.95
500 Channels • 20 banks • Alpha numeric display
Size: 10-1/2" Wide x 7-1/2" Deep x 3-3/8" High
Frequency Coverage: 25,000-549.995 MHz, 760.000-823.995 MHz, 849.0125-868.995 MHz, 894.0125-1,300.000 MHz.

The Bearcat 9000XLT is superb for intercepting communications transmissions with features like TurboSearch™ to search VHF channels at 300 steps per second. This base and mobile scanner is also ideal for intelligence professionals because it has a selectable attenuator to help eliminate annoying intermodulation from adjacent frequencies in highly populated areas and selectable AM, Wide FM and Narrow FM modes that allow you to change the default receiving mode of the BC9000XLT. Other features include Auto Store - Automatically stores all active frequencies within the specified bank(s). Auto Recording - This feature lets you record channel activity from the scanner onto a tape recorder. Hi-Cut filter to help eliminate unwanted static noise. You can even get an optional CTCSS Tone Board (Continuous Tone Control Squelch System) which allows the squelch to be broken during scanning only when a correct CTCSS tone is received. For maximum scanning enjoyment, order the following optional accessories: PS001 Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter \$14.95; PS002 DC power cord - enables permanent operation from your vehicle's fuse box \$14.95; MB001 Mobile mounting bracket \$14.95; BC005 CTCSS Tone Board \$54.95; EX711 External speaker with mounting bracket & 10 feet of cable with plug attached \$19.95. The BC9000XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited Uniden warranty.

Shortwave Radio



Sangean ATS909-A Shortwave Receiver

Mfg. suggested list price \$399.95/Special \$249.95
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Frequency Coverage: LW: 153-513 KHz; MW: 520-1710 KHz; SW: 1711-29999 KHz; FM: 87.5-108.0 MHz.

The Sangean ATS909 features 306 memories and great reception.

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Cobra HH45WX-A Handheld CB radio with weather ..\$89.95
Maxon GMRS210+3-A1 GMRS transceiver/SPECIAL ..\$161.95
RELM RH256NBA 25 watt VHF mobile transceiver ..\$284.95
RELM WHS150-A 5 watt VHF handheld transceiver ..\$284.95
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Uniden PRO538W-A CB & Weather ..\$54.95



Radio Scanners

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Bearcat 860XLT-A 100 channel base\$139.95
Bearcat 760XLT-A base/mobile\$179.95
Bearcat 230XLT-A handheld/SPECIAL\$194.95
Bearcat 235XLT-A TrunkTracking scanner\$269.95
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Sportcat 150-A handheld with 800 MHz.\$144.95
Bearcat 80XLT-A handheld with 800 MHz. ..\$129.95
Bearcat BC17-A information mobile\$149.95
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Reim HS200-A handheld CTCSS/800 MHz. ..\$224.95

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Mfg. suggested list price \$699.95/Special \$329.95

FREE - Get an extra BP2500 battery pack, a \$41.95 value when you order a Bearcat 3000XLT. Hurry offer expires 6/30/97.
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Frequency Transfer • VFO Control • Automatic Store
10 Priority Channels • Selectable Mode • Data Skip
Frequency step resolution 5, 12.5 & 25 KHz.
Size: 2-3/4" Wide x 1-1/2" Deep x 7-3/8" High

Frequency Coverage:
25,000-549.995 MHz, 760.000-823.995 MHz, 849.0125-868.995 MHz, 894.0125-1,300.000 MHz.

The Bearcat 3000XLT is the ideal handheld radio scanner for communications professionals. This handheld scanner scans at 100 channels per second and searches at a rate up to 300 steps per second. A selectable attenuator eliminates annoying intermodulation from adjacent frequencies in highly populated areas. Selectable AM, Wide FM and Narrow FM modes allow you to change the default receiving mode of the BC3000XLT. For maximum scanning pleasure, order the following optional accessories: UA502 Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter \$14.95; LC3000 Deluxe swivel leather carrying case \$34.95; BP2500 rechargeable nickel-cadmium battery pack for up to five hours of dependable use \$29.95; ANTMBCNC Magnetic mount scanner antenna with BNC jack and 12 feet of cable \$29.95; ANTSGBC Glass mount scanner antenna with BNC cable \$29.95. The BC3000XLT comes with AC adapter, belt clip, flexible rubber antenna, earphone, owner's manual and one year limited Uniden warranty. Order today.

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It's easy to order from us. Mail orders to: Communications Electronics Inc., P.O. Box 1045, Ann Arbor, Michigan 48106 USA. Add \$17.00 per weather station or radio product for UPS ground shipping, handling and insurance to the continental USA unless otherwise stated. Add \$12.00 shipping for all accessories and publications. Add \$12.00 shipping per antenna. For Canada, Puerto Rico, Hawaii, Alaska, Guam, P.O. Box or APO/FPO delivery, shipping charges are two times continental US rates. Michigan residents add state sales tax. No COD's. Satisfaction guaranteed or return item in unused condition in original packaging within 61 days for refund, less shipping charges. 10% surcharge for net 10 billing to qualified accounts. All sales are subject to availability, acceptance and verification. Prices, terms and specifications are subject to change without notice. We welcome your Discover, Visa, American Express or MasterCard. Call anytime 1-800-USA-SCAN or 1-800-872-7226 to order toll-free. Call 313-996-8888 if outside Canada or the USA. FAX anytime, dial 313-663-8888. Dealer and international inquiries invited. Order from Communications Electronics Inc. today.

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Monitoring the UK Royal Air Force

In our December 1996 *Utility World* column, we passed along the new United Kingdom Royal Air Force frequencies/designators list. Since that time several *UW* readers have listened to these frequencies and have asked if we also have a list of RAF callsigns and selective calling identifications available. We surely do!

The most common ground callsign heard on RAF HF frequencies is "Architect." This is the main callsign for the RAF STCICS (Strike Command Integrated Communications System) and the station is located at Upavon. Some of the primary frequencies on which you can hear Architect in USB include: 2591 (ST), 4540 (UT), 4742 (FS), 5714 (ZZ), 6739 (B), 8190 (RA), 8983 (HJ), 9031 (DW), 11205 (A), 11235 (EK), 11247 (HW), 15031 (H), and 18018 (BE) kHz.

On the half hour, Architect transmits color coded weather information for selected air fields in the United Kingdom. These colors represents the type of current weather at a particular air field.

■ RAF STCICS Color Codes/Frequencies/Callsigns

H+00 QNH broadcast/H+30 airfield color state broadcast

Surface Visibility (km)	Color	Base of Lowest Cloud
8	Blue	2500 feet Above Ground Level (AGL)
5	White	1500 feet AGL
3.7	Green	700 feet AGL
1.6	Yellow	300 feet AGL
.8	Amber	200 feet AGL
Less than .8	Red	Below 200 feet or sky obscured
---	Black	Not usable for reasons other than cloud or visibility

The RAF also has a VOLMET station on the air that continuously transmits aviation weather information for various airfields in the UK. Recently the 4715 kHz transmission was abandoned in favor of 5450 kHz. The other frequency to check is 11253 kHz.

Some of the other ground stations commonly heard on the RAF channels include:

Callsign	Location: Active Frequencies
Haven	Wideawake, Ascension Island: 4742, 6739, 9031, 11235, 11247 kHz
Belize	Stanley Field, Belize: 11205 kHz
Cyprus	Akrotiri, Cyprus: 6712, 9031, 11235, 11247, 18018 kHz
Viper	Mount Pleasant, Falkland Islands: 11235 and 11247 kHz
Gibraltar	Gibraltar: 9031, 11235, 11247 kHz

The most common aircraft callsign you will encounter on RAF frequencies is Ascot ####. Ascot flights are the transport aircraft of the British RAF.

Here is a summary of the RAF Ascot callsigns:

Ascot 248-250	C-130 Hercules LTW Lyneham
Ascot 701-749	Various aircraft 32 (The Royal) Squadron Northolt
Ascot 750-799	C-130 Hercules LTW Lyneham
Ascot 800-899	Various aircraft 38 Group Brize Norton
Ascot 900-960	C-130 Hercules LTW Lyneham
Ascot 1000-1099	Various aircraft 32 (The Royal) Squadron Northolt
Ascot 1000	RAF CinC Strike Command
Ascot 1001	RAF A.O.C. 1 Group
Ascot 1050-1099	RAF CinC AF North



The RAF Red Arrow Flight demonstration team.

Ascot 1100-1199	Various aircraft Brize Norton VIP
Ascot 1200-1799	VIP flight various aircraft 32 (The Royal) Squadron Northolt
Ascot 1800-1999	Various aircraft 32 (The Royal) Squadron Northolt
Ascot 2000-2899	VC-10 10 Squadron Brize Norton
Ascot 2900-2999	RAF Spare
Ascot 3000-3099	Tristar 216 Squadron Brize Norton
Ascot 3100-3199	RAF Spare
Ascot 3200-3999	Tristar 216 Squadron Brize Norton
Ascot 4000-5999	C-130 LTW Lyneham
Ascot 6000-6999	Reserved NATO exercises 38 Group Brize Norton
Ascot 7000-7499	RAF Overseas 241 OCU
Ascot 7500-7999	Various aircraft 32 (The Royal) Squadron Northolt
Ascot 8000-8099	Wessex Communications Tasking 50/60 Squadrons Benson
Ascot 8100-9499	Various aerial refueling missions 38 Group Brize Norton
Ascot 9500-9599	RAF tanker spare
Ascot 9600-9699	RAF tanker receivers
Ascot 9700-9999	RAF aerial refueling missions 1 Group RAF headquarters

There is another aircraft callsign you may hear on RAF frequencies associated with the 32 (The Royal) Squadron in Northolt: When any of the British monarchy is aboard a 32nd aircraft, they use the callsign Kittyhawk 1-5. According to one of my British sources, if the letter "R" appears after the number, that would indicate a royal flight on the return leg of a trip. Lesser royals and positioning flights of 32 Squadron aircraft also use the callsign "Kitty."

Some other RAF callsigns that have been reported for members of the royal family include:

Leopard	The Duke of York acting as captain of an aircraft
Rainbow	The Duke of Edinburgh acting as captain of an aircraft
Unicorn	The Prince of Wales acting as captain of an aircraft

Table One is a list of RAF aircraft that have been recently monitored on British military HF frequencies. We have included the registration number, selcal (selective calling) identification, and aircraft type to aid in your listening.

■ USAF VIP Aircraft Selcals

Speaking of selcals, several readers have asked if any of the SAM (Special Air Mission) from the U.S. Air Force 89 Air Wing at Andrews AFB, Maryland, are equipped to receive these transmissions. Most of the aircraft of the 89th appear to be selcal equipped (see Table Two). I do have some holes, but it's not clear whether the aircraft lack the equipment or if we've just not discovered the selcal yet.

We also don't have any selcals for the E-4B NAOC (National Airborne Command Post) that are sometimes used on SAM missions. Any information on additional selcals for U.S. military aircraft would be appreciated.

Now it is time to see what you have been hearing this month in the *Utility World*.

TABLE 1: RAF Aircraft Selcal List

Selcal	Registration No	Type	Selcal	Registration No	Type
AH-CK	XX507	BAe125	BL-HK	XV102	VC-10
AH-CL	XX508	BAe125	CF-AB	XV103	VC-10
AH-DF	ZE395	BAe125	CF-AE	XV104	VC-10
AH-DJ	ZE396	BAe125	CF-AH	XV105	VC-10
AH-GJ	XV176	C-130	CF-DE	XV106	VC-10
AH-GK	XV177	C-130	CF-DM	XV107	VC-10
AH-GL	XV178	C-130	DH-KL	ZD948	Tristar
AH-GM	XV179	C-130	DH-KM	ZD949	Tristar
AH-JK	XV180	C-130	DJ-AB	ZD950	Tristar
AH-JL	XV181	C-130	DJ-AE	ZD953	Tristar
AH-JM	XV182	C-130	DJ-AH	ZD951	Tristar
AH-KL	XV183	C-130	DJ-BC	ZD952	Tristar
AH-KM	XV184	C-130	DJ-FH	ZD620	BAe125
AH-LM	XV185	C-130	DJ-FK	ZD621	BAe125
AJ-BD	XV186	C-130	DJ-FL	ZD704	BAe125
AJ-BE	XV187	C-130	DJ-FM	ZD703	BAe125
AJ-BF	XV188	C-130	EF-AD	ZA140	VC-10
AJ-BG	XV189	C-130	EF-AG	ZA141	VC-10
AJ-BH	XV190	C-130	EF-AH	ZA142	VC-10
AJ-BK	XV191	C-130	EF-AJ	ZA143	VC-10
AJ-BL	XV192	C-130	EF-AK	ZA144	VC-10
AJ-CE	XV195	C-130	EG-AJ	XR806	VC-10
AJ-CF	XV196	C-130	EG-AK	XV108	VC-10
AJ-CG	XV197	C-130	EG-AL	XV109	VC-10
AJ-CH	XV198	C-130	EM-BQ	ZE702	BAe146
AJ-CK	XV199	C-130	LM-BD	ZE700	BAe146
AJ-CL	XV200	C-130	LM-BE	ZE701	BAe146
AJ-CM	XV201	C-130			
AJ-DE	XV202	C-130			
AJ-DF	XV203	C-130			
AJ-DG	XV204	C-130			
AJ-DH	XV205	C-130			
AJ-DK	XV206	C-130			
AJ-DL	XV207	C-130			
AJ-DM	XV208	C-130			
AJ-EG	XV209	C-130			
AJ-EH	XV210	C-130			
AJ-EK	XV211	C-130			
AJ-EL	XV212	C-130			
AJ-EM	XV213	C-130			
AJ-FH	XV214	C-130			
AJ-FK	XV215	C-130			
AJ-FM	XV217	C-130			
AJ-GL	XV218	C-130			
AJ-GM	XV219	C-130			
AJ-HL	XV220	C-130			
AJ-KM	XR807	VC-10			
AJ-LM	XV221	C-130			
AK-BD	XV222	C-130			
AK-BE	XV223	C-130			
AK-BG	XV290	C-130			
AK-BH	XV291	C-130			
AK-BJ	XV292	C-130			
AK-BL	XV293	C-130			
AK-BM	XV294	C-130			
AK-CE	XV295	C-130			
AK-CF	XV296	C-130			
AK-CH	XV297	C-130			
AK-CJ	XV298	C-130			
AK-CL	XV299	C-130			
AK-CM	XV300	C-130			
AK-DF	XV301	C-130			
AK-DG	XV302	C-130			
AK-DH	XV303	C-130			
AK-DJ	XV304	C-130			
AK-DL	XV305	C-130			
AK-DM	XV306	C-130			
AK-EG	XV307	C-130			
BK-CL	XR808	VC-10			
BL-GK	XR810	VC-10			
BL-HJ	XV101	VC-10			



The RAF Red Arrow Hawk aircraft.

Selcal	Registration No	Type
LM-BJ	ZE704	Tristar
LM-BK	ZE705	Tristar
LM-DG	ZE706	Tristar
LM-FG	ZA149	VC-10
LM-FK	ZA148	VC-10
LM-GK	ZA147	VC-10

TABLE 2: U.S. Air Force VIP Aircraft Selcals

89 AW Aircraft—Andrews AFB, MD

SAM 049	C-20C tail no 50049 (85-0049)
SAM 050	C-20C tail no 50050 (85-0050)
SAM 200	C-20B tail no 60200 (86-0200)
SAM 201	C-20B tail no 60201 (86-0201)
SAM 202	C-20B tail no 60202 (86-0202)
SAM 203	C-20B tail no 60203 (86-0203)
SAM 204	C-20B tail no 60204 (86-0204)
SAM 205	C-20B tail no 60205 (86-0205)
SAM 206	C-20B tail no 60206 (86-0206)
SAM 300	C-20H tail no 00300 (90-0300)
SAM 375	C-20H tail no 20375 (92-0375)
SAM 403	C-20H tail no 60403 (86-0403)
SAM 681	C-9C tail no 31681 (73-1681)
SAM 682	C-9C tail no 31682 (73-1682)
SAM 683	C-9C tail no 31683 (73-1683)
SAM 970	C-137B tail no 86970 (58-6970)
SAM 973	C-137C tail no 86973 (58-6973)
SAM 974	C-137C tail no 86974 (58-6974)
SAM 26000	C-137C tail no 26000 (62-6000)
SAM 27000	C-137C tail no 27000 (62-7000)
SAM 28000	VC-25A tail no 28000 (82-8000)
SAM 29000	VC-25A tail no 29000 (82-9000)

Selcal AF-EP
Selcal AF-GP
Selcal AF-HP
Selcal AF-JP
Selcal AF-KP
Selcal AF-LP
Selcal AF-MP
Selcal DF-BS
(c/n 1256, ex-N438GA)
Selcal AF-DP

Selcal AE-LP
Selcal AE-KP
Selcal AE-JP
Selcal AE-HP
Selcal AE-FP
Selcal AE-MP

1 ACCS Aircraft—Offutt AFB, NE

SAM 125	E-4B NAOC tail no 50125
SAM 676	E-4B NAOC tail no 31676 (73-1676)
SAM 677	E-4B NAOC tail no 31677 (73-1677)
SAM 787	E-4B NAOC tail no 40787 (74-0787)

Unidentified SAM Aircraft

SAM 376	USAF aircraft reported C-135 tail no 00376 (60-0376)
SAM 417	USAF aircraft refueled with an Orca 51 (KC-10 tanker)
SAM 518	USAF aircraft reported EC-135K tail no 91518 (59-1518)

Abbreviations used in this column

AB	Air Base	Meteo	Meteorology
AF2	Air Force 2	MFA	Ministry of Foreign Affairs
AFB	Air Force Base	m/v	Motor Vessel
AM	Amplitude Modulation	NCS	Net Control Station
AMC	Air Mobility Command	Piccolo	6- or 12-tone multi-frequency-shift keying teleprinter system.
ANDVT	Advanced Narrowband Digital Voice Terminal	POL-ARQ	Polish diplomatic ARQ teleprinter system
CW	Continuous Wave (Morse code)	ROU-FEC	Romanian diplomatic version of the forward error correction teleprinter system
DSN	Defense Switching Network	RTTY	Radioteletype
EAM	Emergency Action Message	SAM	Special Air Mission
ECM	Electronic Countermeasures	Selcal	Selective Calling
ETA	Estimated Time of Arrival	SITOR-A	Simplex teleprinting over radio system, mode A
FEC-A	One-way traffic FEC teleprinter system	SWED-ARQ	Adaptive Swedish diplomatic simplex ARQ teleprinter system
GEP	Ground Entry Point	UHF	Ultra High Frequency
GHFS	Global HF System	Unid	Unidentified
HF	High Frequency	USB	Upper Sideband
ID	Identification	VIP	Very Important Person
LDOD	Long Distance Operational Control		
LSB	Lower Sideband		

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Time Universal)

- 3113.0 SPAR 63 working Andrews VIP at 2309. (Jones-CA)
- 3134.0 Longhand working Nightwatch 01 at 0503. (Jeff Haverlah-Houston, TX)
- 3143.0 Cardgame working Wildman, requests he go secure. Wildman unable and asks Cardgame to check his callsign list at 0214. (Duke Rumley-Mayoclan, NC)
- 3274.0 Unid station using scrambled voice at 2333. (Fernand Vallancourt-St. Pamphile, PQ)
- 3307.0 Juliet/Hotel working stations Charlie Charlie, Charlie Whiskey, and Quebec in possible USN tracking net at 2130. (V. Muller-San Diego, CA)
- 4028.0 Spanish female 5-digit number station in AM at 0500. (Rich Barnes via email)
- 4326.0 R-Russian Navy Ustinov, Russia, with continuous CW channel marker at 2246. (Ary Boender-Netherlands)
- 4346.0 9AR-Rijeka Radio, Croatia, with V CW channel marker at 2240. (Boender-Netherlands)
- 4347.0 Unid station with CW 5-figure traffic at 2237. (Boender-Netherlands)
- 4448.0 Nightwatch 01 working Andrews with data at 0446. PACAF 01 working Andrews for a good GHFS/freq Macdill/4745.0 and others were tried at 0745. (Jones-CA)
- 4472.0 Nightwatch net with Nightwatch 01, Hailstone, and Lumpsum (EAM broadcaster) at 0534. (Haverlah-TX)
- 4490.0 SAM 375 working Andrews VIP for signal checks on F-700 primary at 0130. ETA is 0655 (didn't catch the destination). Also tried 6993.0 and 3144.0. (Jones-CA)
- 4495.0 Assistant calling Nightwatch 01 at 0342. (Haverlah-TX)
- 4558.0 C-Russian Navy Moscow, Russia, with continuous CW channel marker at 2234. (Boender-Netherlands)
- 4633.0 Unid station in CW at 2230, message to 894 in 5-figure groups. MRA01 working MRH19, MRO02, MRW98M1, MRO44, MRH30, and MRS46. (Boender-Netherlands)
- 4724.0 Andrews GHFS with a 20 character EAM "For Minot" at 0347. (Haverlah-TX)
- 4742.0 Andrews VIP checking Air Force 2 here for new primary, and AF 2 working Andy for phone patch to Waldorf regarding GEP freq at 0655. (Jones-CA)
- 5080.0 Hotel working Foxtrot and many other single letter calls with tracking net communications at 0000. (Jones-CA)

- 5405.5 Charlie-8 working Lima-3, Tango-1, and others (with Plead Control mentioned) in tracking net. Later on, mentioned spending some time in port at Hawaii that evening. Seems to be a lot of ships involved with this at 1630. (Jones-CA)
- 5535.0 US Air 14 calling London LDOD at 0130 for a selcal check. Also caught Speedbird 192 requesting a diversion to Atlanta due to "strange noises on right hand side of aircraft" at 2304. Final clearance to Atlanta given at 2323. (Ken Maltz-Syosset, NY, via email)
- 5680.0 Kinloss Rescue, United Kingdom, working SRG 128 at 1050. (Boender-Netherlands)
- 5752.1 HBD20-MFA Berne, Switzerland, with SITOR-A traffic at 0948. Bonn and Brussels embassies were both on the same frequency. HBD64-Swiss embassy Bonn, Germany, with SITOR-A message traffic to HBD20 at 0940. Swiss embassy Brussels, Belgium, with SITOR-A messages to HBD20 at 1051. (Boender-Netherlands)
- 5759.1 Rolling-Thunder working Blacklist with requisition requests (JTRs or JTARs?). Mentioned something about F-18s, but I couldn't make it out at 0210. (Jones-CA)
- 5773.0 HBD20-Swiss embassy Tel Aviv, Israel, with SITOR-A message traffic to HBD20 at 1051. Swiss embassy Paris with SITOR-A message traffic to MFA Berne at 1319. (Boender-Netherlands)
- 5800.0 Hotcake calling Nightwatch 01 at 0605. (Haverlah-TX)
- 5875.0 Assistant called Nightwatch 01 at 0333, but was lost in the heavy shortwave broadcast interference. (Haverlah-TX)
- 6350.0 Unid station transmitting only foxes with no ID using 75 baud RTTY at 0006. Noted parallel transmission on 6797. (Boender-Netherlands)
- 6655.0 Honolulu ARINC working Korean Air 020 at 1311. (Maltz-NY)
- 6683.0 SPAR 63 working Andrews VIP regarding arrival at Ramstein AB at 0645. (Jones-CA)
- 6691.0 Duckcall worked Tenacity in voice, data, and t-quad (time standard ticking and top of the minute "pips") at 2143. (Haverlah-TX)
- 6692.5 Royal Navy Sea Cadets stations: MFK62, MFP38, MFP34, MFJ22, MFP29, MFJ99, and MFQ40C working each other at 1006. (Boender-Netherlands)
- 6693.0 S4JG worked 7TW in voice, ANDVT, and CRATT at 0616. (Haverlah-TX) *Can any of our readers out there confirm that the callsign S4JG is in fact used by U.S. Navy aircraft (as a whole) as a general callsign? (This is a US Navy aircraft.) This one has been haunting me for some time now, and several of us would like to put this little mystery to bed-Larry.*
- 6715.0 C-5-V working McClellan with phone patch to 3rd Reefer (sounded like) DSN 553-7132 re: medical emergency onboard at 0130. (Jones-CA)
- 6717.0 Halifax Military working Lima One Zulu at 0606. "No joy on RATT test." (Haverlah-TX)
- 6717.0 Andrews VIP checking Air Force 2 here for possible new primary at 0649. (Jones-CA)
- 6719.4 Foxtrot-9-India was up here at 0025 looking for Habitat with no joy. Habitat was, however, fairly readable here in the Bay Area as they attempted to establish comms. (Jones-CA)
- 6730.0 SPAR 63 working Andrews VIP with phone patches to Heidelberg at 2230. Andrews VIP calling SAM 300, with no joy at 2035. (Jones-CA)
- 6739.0 Navy 50511 working Andrews (Mystic Star) at 0123. (Haverlah-TX)
- 6739.0 Nightwatch 01 worked Thule GHFS for a signal check at 0151. At 0344, the frequency lit up with an unid station broadcasting a musical train whistle followed by a musical rendition of "I've been working on the railroad." At 0619, E9P called Hickam GHFS with an executing "EXERCISE BEARDIRON" (or maybe GRIDIRON.). Offutt GHFS with a six character EAM "For Santos" at 1503. This is a very rare occurrence, a six character "FOR ..." EAM. (Haverlah-TX)
- 6757.0 Trillion working Nightwatch 01 at 0206. Hotcake calling Nightwatch 01 at 0559. (Haverlah-TX)
- 6761.0 Stump 48 working Turbo 46 at 0047. (Haverlah-TX)
- 6791.5 MARDIV (1Ded as 1st Marine Division) working 1st LAR for voice comms and FAX setup. Also in the net are 3rd LAR, Wolfpack, and others. They're also using 7450.5 at this time, 2110. Several weeks earlier, I heard similar traffic on 8080.0 IDing as 7th Marines also working 3rd LAR. (Jones-CA)
- 6830.0 Air Force 2 (DV-2 + 32) working Andrews VIP for phone patch to SAM Command at 0110. (Jones-CA)
- 6830.4 Romeo-50 trying to raise Romeo-51. No joy at 2316. (Jones-CA)
- 6970.0 "Fifth Marines" working "15" for KL-43 data traffic. "511" is also up discussing KL-43 setup details at 1730. (Jones-CA)

6993.0	Air Force 1, on primary working Andrews VIP for secondary freq. Also tried 8026.0, 8047.0, and 9023.0. Also on freq are SAM 050 and SAM 974 at 0029. (Jones-CA)		
7500.0	"1st MARDIV" (Marine Division) working "3rd LAR," "1st Tank Battalion Scouts," and others, with radio checks at 2340. (Jones-CA)	11003.0	Netherlands)
7527.0	GYU-Gibraltar, using a 6-tone piccolo system with test message, "test de GYU" at 0045. (Vaillancourt-PQ)	11026.0	Unid Spanish stations in LSB repeating "cambio" in rapid fire exchange at 0807. (Boender-Netherlands)
7690.0	SPAR 19 working Andrews VIP for Andrews "NCS" meteo/weather (didn't catch the time) and 0700Z weather for Robbins AFB at 0246. Blacklist working Icepack (USMC) regarding mission status reports at 1618. (Jones-CA)	11073.5	ANDVT transmissions at strong levels at 2340. (Jones-CA)
7831.0	Saturday calling Nightwatch 01 at 0613. (Haverlah-TX)	11073.5	"912" working Atlas with phone patch traffic at 1858. (Jones-CA)
7948.0	F9S-French embassy Prague, with plain text and 5-letter groups message using 192 baud FEC-A at 1136. (Boender-Netherlands)	11100.0	Two unids: a ground station (?) and a cargo aircraft, apparently a training flight. The guy on the ground was testing the guy in the air on his ability to prepare for, among other things, a malfunctioning pressure door and a crash-landing at 1937. (Jones-CA) <i>This has been reported as a possible AMC airlift training channel-Larry.</i>
8012.0	Spanish female 5-digit number stations in AM at 0500. (Barnes)	11174.0	Offutt with 26 character EAM transmission, off frequency at one of his keyed sites at 0542. (Haverlah-TX)
8026.0	SAM 375 (0 DV) transporting "security escort," working Andrews VIP with phone patches regarding 0220Z arrival at Andrews AFB. Patches at 2350. (Jones-CA)	11175.0	Tempo 82 working Forbes Command Post on a phone patch at 2005. (Barnes) Rockin Robin with numerous calls to "any station this net" throughout the week. Snoop 39 working MacDill with a phone patch to a 238 DSN number. Station on the other end ID'ed as Carbonate (aka Nigara Falls Guard), with a request on the status of Fuzzy 53 at 1501. Keyhole (active over a two day period) called Yokota GHFS and raised Offutt GHFS, but begged off saying he was trying to raise Yokota at 1451. (Haverlah-TX)
8028.0	MFA Bucharest, Romania, with 164 baud ROU-FEC encrypted messages at 1121. (Boender-Netherlands)	11181.0	Term 99 working McClellan GHFS with a brief connectivity phone patch with Raymond 12, and gone after being put through the challenge process by McClellan GHFS at 1639. (Haverlah-TX)
8047.0	Air Force 2 working Andrews VIP with phone patch at 0643. (Jones-CA)	11214.0	SAM 300 working Andrews VIP with phone patches at 1830. (Jones-CA)
8145.0	EIP-Shannon Air, Ireland, with 50 baud RTTY meteo messages at 1118. (Boender-Netherlands)	11220.0	Navy 511 working Andrews VIP with phone patches regarding a 2355Z arrival at Howard AFB at 2336. SPAR 99 working Andrews VIP for signal checks and a phone patch to Ramstein AB at 1624. SAM 300 (DV-2 + 7) enroute KMCI (Kansas City) ETA 2200Z, working Andrews VIP with voice and ANDVT at 1930. SAM 974 (DV-2 + 37) departed 0314Z (I assume this would be from Hong Kong) estimated block time for Yokota AFB is 0605Z; working Andrews VIP with phone patches to "the Embassy" and SAM Command for mission status report. 8026.0 was the secondary freq at 0240. (Jones-CA)
8304.0	LOR-Argentina with 5-letter groups using 75 baud RTTY at 0005. (Vaillancourt-PQ)	11226.0	SAM 203 working Andrews VIP with preflight signal checks prior to departure for Randolph AFB, Texas with ETA at 2140Z. Too weak to make out much else, but they are requesting Customs upon arrival at Randolph. Noted at 1506. (Jones-CA)
8340.0	9HHE4-m/v Amberworking Dynacom using SITOR-A at 1433. (Boender-Netherlands)	11229.0	Packmule working Resend (sounded like) with a 20 character EAM: "5W15CA..." Noted at 0005. (Jones-CA)
8341.0	USVV-m/v <i>Khinegane</i> N853 working Kiev Radio in CW at 1538. (Boender-Netherlands)	11235.0	Royal Australian Air Force Sydney (good levels) working various Australian air force aircraft at 0737. It's been two years since I've heard them at these times. (Haverlah-TX) <i>Things are starting to look up with the sunspot cycle swinging back our way-Larry.</i>
8454.0	UIW-Kaliningrad Radio, Russia, with 50 baud RTTY traffic list and news at 1203. (Boender-Netherlands)	11244.0	McClellan GHFS with a very unusual 20(IA)/20(IA)/20(T4) character EAM set over a 13 minute period (usually the concluding EAM string is a 26 character EAM message in length at 2325. (Haverlah-TX)
8703.0	UCE-Arkhangelsk Radio, Russia, with 50 baud RTTY news and traffic at 1130. (Boender-Netherlands)	11413.0	SAM 300 (V-2 + 9) working Andrews VIP with phone patches regarding 2000Z arrival at Macdill AFB. Noted at 1755. (Jones-CA)
8912.0	"46" working Ping Pong (Customs Operation Center in Texas) for landing conditions at Ping Pong. Ping Pong advised they will be met by the "boys in khaki, not the boys in blue." (Hmm...sounds serious). Immediately followed by "390" on "CS3" (this freq apparently) working Hammer regarding receiving a constant key on the primary UHF frequency. Hammer: "We are aware of the problem." Transmissions noted at 2120. (Jones-CA)	11460.0	SAM 375 calling Andrews with no joy at 1754. (Jones-CA)
8968.0	Trillion with a 26-character EAM repeated at 0025, 0055, 0125, 0150 (with his microphone picking up the sound of an in-progress FOXTROT broadcast on the GHFS), and 0155. These H+25/H+55 EAM events usually exist in a 2-hour window. Herky 02 working Lajes GHFS with a phone patch to Ramstein regarding problems with an ECM pod at 0736. (Haverlah-TX)	11494.0	Nightwatch net with Nighwatch 01, Colorbar, Fireant, and Corrugate at 1832. (Haverlah-TX)
8992.0	Nightwatch 01 called "any station" at 0341 then he was gone. (Haverlah-TX)	12070.0	WGY 914 passing "HOTEL" messages to various stations at 1650. (Haverlah-TX)
9025.0	450 working Scott AFB, IL, probably via Offutt GHFS, or other GHFS phone patch. Chatter about "control head for Offutt," and "initiations" through Travis, and "data fields" at 1559. (Haverlah-TX)	13202.9	"German Air Force 218" working (sounded like Arch or March 91-____[?]). They established comms in English and then went into German. Apparently just a signal check at 2345. (Jones-CA)
9057.0	Assistant calling Nightwatch 01 at 0311. (Haverlah-TX)	13211.0	SAM 300, enroute Peterson AFB, working Andrews VIP for signal checks at 2130. (Jones-CA)
9093.0	Spanish female 5-digit number station in AM at 0200. (Barnes)	13218.0	Abnormal 40 (Kwajalein Technical Control) working Abnormal 20 for phone patch to "SATCOM" regarding checking their OM 73 demodulator at 2107. (Jones-CA)
9320.0	SAM 204 (DV-2 + 7) working Andrews VIP with phone patch traffic at 2340. (Jones-CA)	13245.0	Nightwatch 01 working Sensitive at 1847 and moved him to Zulu 270. At 1904, Nightwatch 01 worked Trunion and discussed a designator that sounded like Zulu 330. Captivate also in the net. (Haverlah-TX)
10180.0	MFA Bucharest, Romania, with 164 baud ROU-FEC message traffic at 1115. (Boender-Netherlands)	13440.0	SAM 204 (DV-2 + 8) departed: 1720Z, working Andrews VIP with phone patch to SAM Command regarding correction of ETA from 2020Z to 1920Z at Howard AFB. Noted at 1824. (Jones-CA)
10204.0	Nightwatch net with Nightwatch 01, Treetoad, Paramount, and Furlough at 1541. (Haverlah-TX)	13907.0	Nightwatch 01 worked Ballpark and moved him to Zulu 270 at 2031. (Haverlah-TX)
10314.0	SNN299-MFA Warsaw, Poland, with 100 baud POL-ARQ message traffic at 1042. At 1110 noted SNN299 with message traffic to Madrid. (Boender-Netherlands)	18027.0	Nightwatch 01 worked Ballpark on self-IDed Zulu 270 at 2034. (Haverlah-TX)
10436.0	RETAQEA-Spanish military station with SITOR-A traffic in Spanish almost every day about the same time at 1945. (Vaillancourt-PQ)	23872.0	Sensitive calling Nightwatch 01 on self-IDed Zulu 315, with nothing heard and gone at 1849. (Haverlah-TX)
10582.9	MFA Stockholm, Sweden, with 100 baud SWED-ARQ message traffic at 1019. (Boender-Netherlands)		
10586.0	Andrews VIP working SAM 974 for signal checks on new primary freq at 0341. (Jones-CA)		
10656.0	SOD station with 75 baud RTTY message to NOB on link 70004 at 1045. (Boender-Netherlands)		
10805.0	Avenger working Henshaw, and possibly others in ANDVT. I only caught the calls by chance when Avenger mistakenly keyed up in clear-voice mode for a few seconds at 2232. (Jones-CA) DFZG-MFA Belgrade, Serbia, with 144 baud FEC-A encrypted messages at 1228. (Boender-		



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New Shortwave Station for Mexico City

Robert Searfoss from Atlanta was vacationing in Mexico City for Christmas. When he visited the landmark Latin American Tower, he found near the top the studios of a new commercial shortwave station, XERTA. He met the Vice President of the operation, Librado Díaz Toledo, whose business card claimed it would use ten languages, as Radio Transcontinental de América. There was some second-hand studio equipment, music playing as if they were on the air. Location is 37th floor, office 3706; phone 510-9896 or Lada [tollfree in Mexico] 91-800-70866; postal address Apartado 653-20, 06002 México, DF. They at first planned to use 17880 and 4800 kHz, and others were given in a list on the wall: 11720, 15120, 17720, 21460, 25620. Thanks to Mr. Searfoss, we were able to break this story on *World of Radio* and in our Spanish reports.

We forwarded the info to our friend at XERMX, Julián Santiago Díez de Bonilla. He had already been contacted by an old acquaintance, the longtime professional announcer Gonzalo Soto,

who asked him to work for the new station, which had been started by an 82-year-old gentleman, Roberto Nárdena[?] Martínez who wanted to get into SW broadcasting. They hoped to start testing as early as Feb 5 on 15120 daytime, 4800 at night, but had not been heard yet in the following two weeks—15120 would have problems with Nigeria which was noted back with African music on Feb 14 at 1710 after a long absence from this channel; as well as adjacent HCJB 15115 in the mornings; and 4800 would clash with Guatemala and utility interference.

Julian planned to work at both stations, and reported further on his XERMX DX and mailbag programs: XERTA is very short on everything with second-hand equipment, so please send \$1 or an IRC when writing them. Gonzalo Soto is the Director General. A used 5 kW transmitter is in southern Mexico City, with antenna beamed north for an ERP of 50 kW. Authorization has already been granted by the Secretariat of Communications. Perhaps everyone will be hearing it by the time you read this?

ANGUILLA Caribbean Beacon reactivated 6090 Feb 13, and 11775 on Feb 14 (Ed Rausch, NJ) During mostly silent stretch in Jan, heard testing on another 25mb channel between 1200 and 1300, and at 1230 on 17805. Heard on WWCR, Dr. Gene Scott went on a tirade humiliating the [expletive deleted] Anguilla operator for running the transmitter without air-conditioning and damaging some parts (Ivan Grishin, Ont., *World of Radio*)

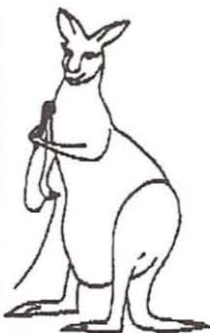
ANTARCTICA LRA36, 15475, R. Nacional Arcángel San Gabriel, expected back in March, was already back in early Feb, at 1900-2000 only, last 20 minutes in English. French, first heard with strong signal by Raymundo Cruz and Walter Tomarelli (Gabriel Iván Barrera, Argentina, DSWCI DX Window)

AUSTRALIA The ABC Board of Directors meeting Feb 5, supposed to decide the fate of R. Australia, deferred the decision due to outpouring of support for RA; probably will be up to the government to decide (source deleted by HCJB DX Partyline)

The Foreign Affairs, Defence and Trade References Committee of the Australian Senate will hold an inquiry into Radio Australia and Australia Television. Its report is due by May 14, but may be earlier in order to influence the Government's 1997/98 budget, which will be handed down on May 13. Written input from the public is invited, and public hearings are expected in major cities, at least Melbourne and Canberra. Contact the Secretary of the committee and Parliament House, Canberra, ACT 2600; fax 61-6-277-5818 (Matt Francis, Tasmania, via Bill Westenhaber)

Express support to R. Australia, which will be passed on to proper authorities: ratx@radio-abc.net.au fax +61 3 9626 1899. Also to Sen. Richard Alston, Minister for Communications and The Arts: minister@dca.gov.au fax +61 6 273 4154 (David Onley, Vic., via Kevin Hecht)

Mansfield Report claim that RA's audience has diminished from 100M to less than 20M is nonsense (Graham Mytton, BBC Audience Research, who was not asked for input, VOA Communications World) Many Pacific nations expressed support for continuing RA, such as Tonga, New Caledonia, East Timor Nobel Prize winner (BBCM) Papua New Guinea even offered to forego a megakina in Australian aid if RA would be kept on (Mike Bird, RN Media Network)



All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; Z-96 = Summer season; W-96 = Winter season; [non] = Broadcast to or for the listed country, but not necessarily originating there.

BELGIUM Some members of parliament are calling for RVI not to drop the three languages next October as previously announced (DSWCI DX Window)

BRAZIL Not every day you hear a Brazilian on five frequencies at once, but R. Canção Nova at 2301 ID amid religion on nominal 9675 as well as 'bookend' spurs 9652.3 and 9797.7 //6105 and 4825. Hard to believe 9675 is only 10 kW; new transmitter? (Bob Hill, MA, DSWCI DX Window)

BRUNEI After an absence of decades, RTV Brunei hopes to return to SW soon. An international SW service is planned and this project is about to be put out to tender for the transmitters and antennas to be built. I learned this from the CE at BFBS Brunei (Maarten van Delft, DSWCI DX Window)

CAMEROON CRTV Yaoundé, 4850 at 2030-2115 verified in 2 months for a taped report and \$2, by unregistered mail. PWBR 1997 has different address, but this came via CRTV, B.P. 1460, Douala as in WRTH 1997 (Ed Rausch, NJ)

CHILE R. Santa Maria, 6029.6v sked is Mon-Sat 0900-0300, Sun 1000-0300; relays news from R. Chilena, 660 Mon-Sat 0900-1000, 2200-2230, Tue-Sun 0200-0230, Sun 1100-1130, 1600-1630, Mon 0200-0230.

R. Patagonia Chilena, 6080, Mon-Sat 0930-2400, Sun 1000-2400. Relays news from R. Nacional, 1140: Mon-Sat on the hour, and at 1600-1700; also sports program *Más Deportes* relay daily 1100-1200, 1700-1800.

R. Esperanza, 6090, is 24h in Spanish, except English daily 0630-0700, German Sun only 1200-1230; QSLs directly from its well-known Temuco address (Gabriel Iván Barrera, Chile, BC-DX) Casilla 830, that is, Saul Vergara is not authorized to QSL, as he previously offered to do (Barrera, DXing with Cumbre)

COLOMBIA The former Súper frequency of 6065 is now occupied by Colmundo Bogotá on 6065.1 relaying HJCJ-1040, heard at 2240 since mid-January. Wants reports (Henrik Klemetz, *Dateline Bogotá*) Includes program *Frecuencia Internacional* UT Mon 0400-0430 (Klemetz via DXing with Cumbre)

CONGO RTVC, Brazzaville, 9610 heard at 1236-1243 on a Sat with English *News Review* inviting listeners to watch TV for more (François Steyn, RSA, DSWCI DX Window)

COSTA RICA RFPI's *Global Community Forum* has suspended live call-ins, as James Latham is on sabbatical until August writing a book about the far right; continues

BETH ONDROEF VAN DE
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with interviews by Brad Heavner UT Fri 0200, Sun 0400 plus repeats (RFPI) Jennifer Harbury, human rights activist whose Guatemalan revolutionary husband was murdered with CIA coverup, has started a new show: *CIA: Commentary and Critique* on RFPI, Fri 1845, Sat 0245, 0945, and also on Mondays during *FIRE* in English and Spanish. Also new (replacing *Africa Speaks*) is *Our Americas: The Weekly Report on Latin America and the Caribbean* from WBAL, Pacifica New York, Weds 1900-2000, Thurs 0300, 1000 (RFPI Previews via George Thurman) Some programming shifts may occur April 1 as a new quarter begins (gh)

CUBA RHC's 1997 contest: Why is it important to revive the World Youth and Students Festival? The best two answers receive an all-expenses paid trip to Cuba to attend the 14th Festival, July 28-August 5. Entries must be received by June 30. You may answer by using poetry, songs, acrostics[!]. Replies can be written or in form of radio or TV programs, to: Radio Havana Cuba, P O Box 6240, Havana, Cuba; fax (537) 705810 (via Lourdes López, RHC, ASWLC) I wrote her back saying Youth Festivals should not be revived, as they were only forums for pushing political ideology. (Gigi Lytle, TX, *Continent of Media*)

RHC testing new rebuilt antenna beamed 20° on 6180, with 13 dB gain, 100 kW transmitter for 2 Megawatts ERP: 0000-0200 Spanish, 0200-0230 Creole, 0230-0330 French, 0330-0400 Creole repeat, 0400-0500 English (RHC *DXers Unlimited*)

CYPRUS NORTHERN R. Bayrak is on 6158.4 at 0400-2200, 2nd program mainly pop music in English; bad modulation, IDs in Greek, English, Turkish giving FM 87.8 and 105.0 (*Panlview*) Had been off for several years, separate radio country (gh) 6159.0 at 1825-2201* closing with English and Turkish IDs for FM (Harald Kuhl, Germany, *Play DX*) 6159.3v presumably this at 1530-1602* (Nikolay Pashkevich, Russia, *BC-DX*)

CZECH REPUBLIC It was remarked on a R. Prague mailbag show that they were on a 30-day contract and the English department might not be funded beyond the end of Jan (Sheila Hughes, *BDXC Communication*) Still heard in February, but endangered?

ECUADOR R. El Buen Pastor, 4815, verified a taped report with a prepared card, and sent a pennant bearing the name Radio Alii Michic, which I suppose is the Quechuan name of the station (Henry Lazarus, LA, *Fine Tuning*)

We're aghast at apparent new policy at HCJB *DX Partyline* of deliberately deleting sources of much of the info quoted. Can't imagine why professional and club publications would continue to supply them info under such circumstances (gh, *World of Radio*)

ETHIOPIA R. V. of Peace, 9560.2, new transmission in Somali 1908-2000* closing with English ID giving 25, 31 meters (Bob Hill, MA, *DSWCI DX Window*)

[non] V. of Oromo Liberation, believed via Ukraine, Mon/Wed/Sat 1600-1700 on 9870 announced it was moving to 9930 (BBCM)

FINLAND After a lapse of decades, R. Finland is now sending proper QSL verifications, not just 'audience cards.' Good reception reports are welcome to: Yleisradio Oy, Porin lyhytaaltokeskus, Ms. Marjatta Jokinen, Makholmantie 79, FIN-18660 Pori, Finland. Correct reports will be verified. Comments on RF programming are still welcome to R. Finland HQ in Helsinki (Arto Mujunen, Finland, *World of Radio*)

GUATEMALA On 6180.05, nonstop marimba under Cuba in French 0305-0355, mentioned Guatemala at 0329 break; also next night came on at *0258; possibly R. Nacional de Guatemala back on? (Terry L. Krueger, FL, *DSWCI DX Window*) This was their old frequency, inactive for ages

GUYANA GBC, 3290 at 0940-1000 blasting in with tractor ads, variety of pop and subcontinental music, local level every day (Robert L. Wilkner, FL, *DSWCI DX Window*) Also wrapped up *Nightrider* at 0757, then recitations from Koran and translations into English at 0802, het (gh, OK) Another date was relaying R. Australia cricket vs. West Indies, on 2 second delay at 0709 (Harold Sellers, Ont., *HCJB DX Partyline*)

HONDURAS La Voz de la Mosquitia, 4910v, was expected back soon, with the delivery of new or refurbished transmitters from 75 to 500 watts, dipole; check around 2300-0300 in Spanish, vernaculars, English (Hans Johnson, *DXing with Cumbre*)

HRMI, 5890 QSL says it's based in San Bernardino, California, was still 200 watts, but authorized up to 5 kW. Street address is Col. San Luis, Blvd. Toncontin 4719, Comayagüela, D.C. Plans to have another station built in Bluefields, Nicaragua, later this year (Chris Lobdell, Ed Rausch, *DXing with Cumbre*)

IRAN VOIRI at 2130-2220 in English, not Bosnian as scheduled, on unannounced 9720 (Alan Roe, England, *World of Radio*) English at new time 1100-1157, ex-half an hour later, on 11875, 11930, 15260 (Eugene Gebreurs, RVI *Radio World*) VIRI SW feed of poor quality is now on Internet from somewhere in USA: <http://netiran.com/persianradio.html> (R. Netherlands Media Network)

[non] Azerbaijan Sesi Radyosu, seemingly from Iraq and formerly called V. of Southern Azerbaijan, is on 6055 at 1630-1730 on Sun, Mon, Tue, Thu (*Panlview*) Also heard at 0615, trumpet fanfare, address in Stockholm, at least

100 kW, no cave or desert operation! (Victor Goonetilleke, Sri Lanka, *DSWCI DX Window*)

IRELAND [non] West Coast Radio Ireland, heard on a Saturday at 1400-1600 on 6015 in German via Germany (*Panlview*) Sat at 1400-1700 6015 carried a test using a Saar FM program Offener Kanal Saarbrücken (Kai Ludwig, *Electronic DX Press*) WCRI Eu service changed from Thu at 1500 on 6015 to Sat at 1500-1600 on 5970 (Paul McDonough, *DSWCI DX Window*)



JORDAN R. Jordan puts out spurs: 0700-0800 15435 but also 15245; 1600-1800 13630 but also 13525, 13735; at 1900 on 9830 and also 9660, 10000 (Wolfgang Büschel, *BC-DX*)

KOREA NORTH Korean Central News Agency website is: <http://www.kcna.co.jp> (BBCM) Slanted news you would expect like R. Pyongyang; but with visual of snow-covered "birthplace" of Beloved Leader (gh) R. Pyongyang in Feb missing from many scheduled frequencies, e.g. English at 2000 heard only on 6575 (Bob Padula, *Electronic DX Press*) Presumably due to shortage of electricity, money: hope they're putting what they have into food instead (gh)

KURDISTAN V. of People of Kurdistan, clandestine for Iraq, 1500-1600 on 4117v in Kurdish and Arabic, repeated at 0400-0500 on 4117v; ranging from 4100 to 4150, and at 1000-1100 on 6015v (BBCM)

MADAGASCAR R. Mad, 5009.5, running all-night 0030-0310+ with variety of Afro and US music, ID at 0203 (Brian Alexander, PA) Caused by cyclone hitting the island (Hans Johnson, *Cumbre DX*)

MALTA [non] We heard no trace of R. Melita test to NAm Sundays in Feb at 1600 or 1900 on 13600 or 7400—just VOA São Tomé on 13600 at 1600 (gh)

MYANMAR Yangon steady on 5985.9 for some time, and at same time Myawadi on 5973 holding on until 1500; Taungyi solid at 1200 on 6570. Black clandestine Karen station run by authorities is off (Victor Goonetilleke, Sri Lanka, *BC-DX*) Government has an official website now: www.myanmar.com (RNMM)



*Ours is the Voice of the Silenced.
Ours is the Radio for Liberty.*

[non] Democratic V. of Burma, via Norway at 1430-1500 on new 9725 ex-11850 (Gabriel Iván Barrera, Argentina, *RN Radio-Enlace*)

NETHERLANDS For its anniversary, RN plans an open-house June 7 (RNMM)

NEW ZEALAND After a summer break, *Around the World with Rudi Hill* returned Feb 11, nominally Tue 0930 on 9700 but actually at about 0917-0947, repeated Fri 0430 on 15115. Assuming 4-week rotation holds, April dates would be 8th and 11th (gh) The historic Broadcasting House in Wellington, built in 1962 specifically for broadcasting, home of domestic and RNZI broadcasts, is being torn down. RNZI from now on will make sked changes in accordance with European DST dates, not NZ dates, so from March 29: 1650 on 6070, 1750 on 9795, 1952 on 11735, 2300 on 15115, 0458 on 9795, 0816-1205* on 9700, with variations on weekends (Arthur Cushen, *RNMM*)

KIWI Radio is on a new clear frequency 7475v or alternate 7460v, irregularly Sat, Sun or holidays between 0715 and 1100. Contact at P O Box 3103, Onekawa, Napier; or kiwisagb@xtra.co.nz Was heard here around Xmas (Ken Baird, Scotland, *DWSCI SWNews*) Will be relayed by WRMI, 9955 last Saturday of each month such as Mar 29 at 1000-1030 (WRMI)



NIGER La Voix du Sahel suspected on 9706.18 at 1316-1330 fade, bits of low level audio only during split-second silence from XERMX on 9705 (David Clark, Ont., *DSWCI DXW*) Such an annoying het often here against XERMX around 1600 (gh, OK)

DX Listening Digest

More broadcasting information by country compiled
by Glenn Hauser

Review of International Broadcasting

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NORWAY As of Feb, NRK's Fredrikstad transmitter was supposed to be out of service, with four 500 kW now in service, two at Sveio and two at Kvitsoy (Joe Hanlon, PA)

PAKISTAN Live cricket coverage in English, weak and undermodulated on R. Pakistan, 17900 at 0935 (Richard Jary, NSW, *Australian DX News*) That special may explain last month's BBCM report that English had replaced Urdu at this time - gh. English reduced to 0800-0805 and 1100-1120 on 17900, 15470 and no more English at 1700-1750 (Eugene Gebreurs, RVI *Radio World*)

PALAU KHBN director of engineering tells me that 9910 with RFA Chinese at 1500-1600, 2300-2400 is a new 50 kW transmitter, and a 4th transmitter was due in two months, for a total of 2 x 50 kW, 2 x 100 kW (Arthur Cushen, NZ, *RNMM*) High Adventure Ministries plans to start an Indonesian service on 5085 with 20 kW, Australian on 15140 with 50 kW, sites not given but perhaps from here (HCJB *DX Partyline*)

PERU R. Unión, 6115 24h, is first Peruvian known to QSL by E-mail (Don Moore, *DXing with Cumbre*) runion@amauta.rcp.net.pe Apdo. 833, Lima 27; fax 51+14-407-594 (Andrew Yoder, *ibid.*)

R. Gotas de Oro, Chiclayo, heard last May and believed to be harmonic, now back announcing SW frequency, 4567.7v at 0120-0200+, 1200 (Henrik Klemetz, *Dateline Bogotá* via DSWCI *DX Window*)

Many unlicensed stations have been closed down, but a few have been licensed to new frequencies: R. Ilucán on 3280 ex-5621v, and R. Visión 2000 on 3350 ex-5131.4 (Takayuki Inoue N., *EDXP*) R. Chincheros has been licensed as OAX5A on 4765, maybe on there soon (source deleted by HCJB *DX Partyline*)

RUSSIA VOR is reducing broadcast time sharply. It wouldn't hurt to write to the President to support VOR (Pavel Mikhailov, *VOR DX-Klub* via source deleted by HCJB *DX Partyline*)

Islamskaya Volna, 1600-1700 Tue-Fri on 6130, 6005; at same time on Sat, V. of Assyria, partly in English (BBCM)

SAIPAN MRI has apparently been ordered not to publicize when it is relaying R. Free Asia, but the Mar 4 revision to KHBI schedule showed gaps at these hours when it would be free to carry something else: 0800, 1500, 2000, 2100, 2200 for one transmitter each; and at 2300 and 0100 for both transmitters (gh)

SLOVAKIA AWR resumed 2100 broadcast on 6055 in Feb, but only half an hour, including *Wavescan* half an hour earlier than previously on Sun. It was also missing at 0530 on 5905, but said to have been retimed to 0500 Sun (Mike Barraclough, England, *W.O.R.*)

SOMALIA R. Mogadishu, V. of the Somali Republic, pro-Ali Mahdi Muhammed, on 6822v at 0400-0500, 1000-1130, 1600-1800.

R. Mogadishu, V. of Somali Pacification, pro-Uthman Ali Ato on 6732v at 0300-0500, 0930-1200, 1500-1900, including English news at 1830-1835 (BBCM)

SOUTH AFRICA The Investment Channel was running a 4-minute commercial on Channel Africa at 1608 on 15240 saying it would start broadcasting in a few days, as of late Jan (Roger Chambers, NY, *World of Radio*) Gave this contact info: phone Johannesburg 320-6923; fax 320-6866; P.O. Box 651525, Johannesburg 2010; full sked at: <http://www.sentech.co.za/invest.html> Still not heard by mid-Feb-gh

SRI LANKA The SLBC Sinhala Commercial service Velenda Sevaya is 24 hours on FM, but on SW: 1000-1630, 0000-0200 on 4870, 0200-1000 on 6185. Local time expected to remain UT+6 all year (Victor Goonetilleke, *ibid.*, *BC-DX*)

VOA Iranawila's misfortune: transmitter burned up, putting ash all over everything else, probably not on before yearend, but could bring in a portable 50 kW sooner (Victor Goonetilleke, UADX, *DXing with Cumbre*)

TAHITI RFO, 15167.4 still active in late Jan at 1650-1705, fading up from very weak to surprisingly readable at 1700 in French (David Clark, Ont., DSWCI *DX Window*)

TAJIKISTAN R. Dushanbé English external service at 0345-0400 heard on 9905 (Bob Padula, Vic., *EDXP*) In Persian and Tajik at 0400-0530 on new 5800, not //4635; 1700-1730 on 5800, 4635; 1730-1900 same plus new 5750, maybe replacing traditional 4740, 4940 or 4975? (*Panlview*) new 5750 and 5800 at 1730-1900 are equal strength and much stronger than 4635 here in Moscow (Nikolay Pashkevich, *BC-DX* via *EDXP*)

THAILAND BBC Asia Relay Station finally took over all transmissions previously originating from Hong Kong on 18 November. Prior to this, services had been transferred over gradually. HK remained on standby until 6 Dec, after which the transmitters were dismantled. Dates were specified in a postcard sent from BBC HK and the addr of the new station was confirmed as P O Box 20, Muang Nakhon Sawan 60000, Thailand (Dave Kenny, BDXC *Communication*)

TIBET [non] V. of Tibet progams produced in Oslo, originally via FEBA Seychelles, but now direction-finding points to Central Asia, at 1225-1300 M-F on 7400 (BBCM)

TRT

TÜRKİYE RADYO TELEVİZYON KURUMU TURKISH RADIO TELEVISION CORPORATION

TURKEY Due to German ham protests, VOT at 0400-0450 in English to NAm on 7100 soon moved back to 7300 (Ivan Grishin, Ont., *World of Radio*) Also Turkish at 0500-0800 on 7100 replaced by 6040 (TRT via DF5SX, *BC-DX*)

UGANDA Red Channel announced it was moving from 3340 to 4976 at 1300-2100, 0300-0600 (BBCM)

UK OGBANI Remember that from DST in Europe starting Mar 30, BBC shifts time of many, but not all programs, and on the Americas stream this may happen a week later. Also: "lots of new and exciting programmes beginning in April" (*BBC On Air* via Leroy Long, Chris Hambly)

Reflections Europe is still active every Sunday with religious propaganda, 1600-2300+, one hour earlier with DST, on 6295 which is good here for the first few hours depending on skip, and 3910 which is very good; cannot be sure about 12255 short of visiting the site again. The operator is fond of a drink, and can sometimes be found in his local pub on a Sunday night, way past the s/ off time, hence the carrier remains on sometimes for hours. Address remains The Forge, Cranleigh, Surrey, GU6 7BG (Ken Baird, Scotland, DSWCI *SW News*)

URUGUAY Alexis Hasisanik, CX1DDZ, Chief Engineer says he built the SW transmitter scheduled as follows: 1030-1630 on 6140 with CX20R, Montecarlo; 1630-2330 on 11735 with CX12 R. Oriental; 2330-0330 on 9595 with CX20; however, sports are always on 11735 as late as 0300. Reported problems with harmonics and spurs caused by inept tuning at site (Horacio Nigro, *EDXP*)

USA R. Marti is not run very well and its objectivity should be monitored, according to a federal report. But management did not seek revenge against a whistleblower, according to a report from the USIA inspector general. The agency also decided not to look into claims that Cuban exiles manipulated news coverage in the past (Charles Strouse and Deborah Ramirez, Fort Lauderdale *Sun-Sentinel* via Aaron Pilchick)

R. Free Asia added two languages in early Feb to wildly contradictory times and frequencies from different sources. Likely to have changed more by now, but revised version in mid-Feb was: Burmese 0030-0130 on 7455, 7515, 7530; 1500-1600 on 6240, 7540, 9440. Vietnamese 0030-0130 on 5865, 7415, 9910; 1400-1500 on 5865, 6240, 7520 (VOA *Communications World*) Vietnamese was immediately jammed with Hanoi domestic service a few hundred Hz off frequencies, and drifting (Wolfgang Büschel, Germany) As many as five different hets, transmitters at once on an RFA frequency, some with satellite delay from elsewhere than Hanoi. Vietnam is very serious about jamming this (Victor Goonetilleke, Sri Lanka, *RNMM*) We could barely hear Burmese at 1500 on 7540, 9440, Vietnamese at 1400 on 5865, 6240 (gh) Heading the Burmese service is Soe Thinn, a former Burmese diplomat, while Nguyen Ngoc Bich, a scholar and writer on the arts and public affairs, is director of the Vietnamese service (RFA via BBCM) see also SAIPAN

VOA has been preempting other programming certain Sundays for *Radio Theater Live* "90 minutes" at 1210, 1610, 2010, to the objections of some listeners (VOA *Communications World*)

WORLD OF RADIO on WWCR as expected to be timeshifted for DST from April 6: Thu 2030 15685, Sat 1130 7435, 1300 15685, Sun 0300 3215, 0900 3210, 2330 5070. Tue 1230 & Wed 1130 15685 (gh) *Ham Radio & More* may be terminated at end of March if it continues to be unprofitable for originating station KFNN Phoenix; donations were invited (*HR&M*)

We heard WINB's first transmission at reactivation, Jan 29 at 1818-1900* on 15715; next day tested 11740 from 1900, and after 2200 on 11950, but not regular; one Friday had local schoolchildren giving Pennsylvania history at 2307 (gh, *World of Radio*)

WMLK, 9465, not heard when I was in PA, so called them later. In a guarded conversation, a woman said they were having problems with antenna that kept them off when it is raining! And maintained sked was Sun-Fri 1700-2000, 0400-0900 (Hans Johnson, *Cumbre DX* via *DXW*)

WRNO was having problems with old transmitter, so bought a new one, shipped before it was completely built and is incapable of transmitting in 15 MHz range. Hence only uses 7 MHz until problem fixed (Hans Johnson, *Cumbre DX* via *DX Window*)

We were hearing *DXing with Cumbre* at the secret time of Sun 2300 on 5745 for about three months before it was made known to the producer and then to listeners in general, typical WHRI nonsense. All times on WHRI expected to be one UT hour earlier during DST, but not on KWHR (gh)

Until the Next, Best of DX and 73 de Glenn!



Gayle Van Horn

0018 UTC on 5010

INDIA: AIR-Thiruvananthapuram. Hindu. Interval signal to tentative AIR ID. Mentions of "shortwave" amid text to Indian vocals. (Mark Veldhuis, Borne, Netherlands, via email)

0028 UTC on 3345

INDIA: AIR-Jaipur. Local dialect to subcontinental music. Time-tips at 0030 with possible ID. Newscast to 0035 with announcer's talk. Fair to poor signal quality. (Giovanni Serra, Rome, Italy, *The Four Winds*)

0050 UTC on 12020

VIETNAM: Voice of Vietnamese. Easy listening vocals to announcer's sign-off routine amid VOA's sign-on at 0100 on 12025. (Jerry Witham, Keaau, HI)

0102 UTC on 5930

SLOVAKIA: Radio Slovakia Int'l. English to North America with program announcements, frequency schedule to *Slovakia Today* program. Tape of Presidential address. (Sue Wilden, Columbus, IN, via email)

0115 UTC on 7125

RUSSIA: Voice of Russia WS. *Moscow Mailbag* with discussion on former communist government, Lenin's Tomb, and Stalin's rule. (Bob Fraser, Cohasset, MA) Russian to Europe noted on 7125.3 at 1930. (Edward H. Schwartz, Chicago, IL) *Focus On Asia* on 6150 at 0620. (Witham, HI)

0213 UTC on 9735

PARAGUAY: Radio Nacional. Spanish. Multiple IDs between Paraguayan folk music. (Lee Silvi, Mentor, OH, via email)

0240 UTC on 5645.8

PERU: La Voz de San Antonio. (Tent) Tried after tip in *Cumbre DX* newsletter, and heard with Peruvian music. Female announcer with slogans and slow ballad. No ID, SINPO=24343. (Veldhuis, NLD)

0315 UTC on 4790

PERU: Radio Atlantida. Spanish. Two males chat to commentary and program preview. Sign-off ID to closing national anthem at 0330. (Larry Michalski, West Seneca, NY)

0330 UTC on 4930

HONDURAS: Radio Internacional. Spanish. Folk music to ballads. Brief ID between tunes. Nice catch at 1kW. (Silvi, OH)

0458 UTC on 5810

USA: KAIJ Dallas, TX. Dr Gene Scott's University Network programming, with teachings from Revelations. (Edward H. Schwartz, Chicago, IL)

0530 UTC on 6090

ANGUILLA: University Network. Dr. Gene Scott announcing active 6090 frequency and welcomed call-in reception reports, usual chatter from "Doc," monitored to 0600. (Witham, HI) Monitored 0421-0600 on 6090; 1420-1600 on 11775. (Silvi, OH)

0535 UTC on 6015

AUSTRIA: Radio Austria Int'l. Interval signal to station ID. News coverage including items on tougher national traffic laws. (Schwartz, IL)

0547 UTC on 6110

CANADA: Radio Japan NHK World relay. Feature story on Japan/Australian economic relations. (Schwartz, IL)

0702 UTC on 5985.2

BELGIUM: Radio Vlaanderen Int'l. Flemish to Europe. Newscast with moderate to heavy fading and static. English service at 0730 with news and classical music. (Schwartz, WI) Monitored on 7325 at 0040. (Fraser, MA)

0730 UTC on 6040

CHINA: Jiangxi People's BS. Chinese. Male/female announcers to *Moscow Nights* tune. *The Father of Victory* march song introducing station ID and news at 0800. (Witham, HI)

0930 UTC on 5020

SOLOMON ISLANDS: SIBC. Pidgin/English. Pop tunes to island music interspersed with local commercial for the King Island Craft Shop. (Witham, HI)

1105 UTC on 4779.3

ECUADOR: Radio Oriental. Spanish. Station ID, "a traves de Radio Oriental, desde la provincia de Tema, Macas." News to additional ID with frequency quote. (Pedro Arrunategui, Lima, Peru, *TFW*)

1152 UTC on 4925

INDONESIA:(Sumatra) RRI-Jambi. Indonesian. Pop vocals to 1159 interval signal. RRI identification into Jakarta news relay. Signal stronger than usual but relay audio poor. (Bob Hill, Holliston, MA, *TFW*) Tentative logging on *Voice of Indonesia* (Java) on 9525 at 2000-2015, French service with Indo music. (Silvi, OH)

1230 UTC on 11615

FRANCE: Radio France Int'l. Report on circuses performing in Paris. (Fraser, MA; Schwartz, IL)

1235 UTC on 9580

AUSTRALIA: Radio Australia. *Report From Asia* with report on files released on Australia's role in the Vietnam War. (Fraser, MA) Sporting event noted in English at 0025 on 17880 USB. (Witham, HI)

1335 UTC on 5975

UZBEKISTAN: Radio Tashkent. English to South Asia. Decent signal to news topics interspersed with Middle Eastern style music. Moderate to heavy fading. (Schwartz, WI)

1440 UTC on 13830

CROATIA: Croatian Radio. Classical music including Khachaturian's *Sabre Dance*. Station ID on the hour followed by newscast. (Michalski, NY) English news noted on 5895 at 2301. Sent my report via email and received my card via snailmail. (Wilden, IN)

1615 UTC on 11840

NORWAY: Radio Norway Int'l. *Sounds of Norway* featuring modern music based on old folk tunes. (Fraser, MA) Norwegian service to North America heard on 9590 at 1800. Program *Dette er Norge*, including news and national weather—great practice for my Norwegian! (Schwartz, WI)

1627 UTC on 4010.02

KYRGYSTAN: (Tent) Kyrgyz Radio. Presumed Kyrgyz language with male/female duo talk and ID format at 1630. Music into a radio play format. (Serra, Italy)

1730 UTC on 3665.8

PAKISTAN: Azad Kashmir Radio. Presumed Pakistani. Two males discussing Pakistan to Middle Eastern music. Monologue continuing to final signal fade out. (Witham, HI) Station noted on 9400 at 1830 in Hindu. (Zacharias Liangas, Thessaloniki, Greece, *TFW*)

1750 UTC on 6940

CHINA: China Radio Int'l. Russian/German. Announcers text to 1755. Interval signal with German ID and news. Noted //6950, 6960, 6970 kHz. (Witham, HI)

1756 UTC on 9555

SAUDI ARABIA: BSKSA Arabic service to North Africa. Heard on // 9870 to Europe. Very nice Middle Eastern music, fair to good signal on both frequencies. (Silvi, OH)

1805 UTC on 4800

LESOTHO: Radio Lesotho. Sesotho. Religious service to choir music. (Witham, HI)

1809 UTC on 11990

KUWAIT: Radio Kuwait. Text on landmines left from the Iraqi invasion continue to cause problems. Music from Kenny G to newscast at 1830. (Wilden, IN)

1825 UTC on 7210

QATAR: Qatar BC Service. Arabic monologue to regional music. (Witham, HI) Station noted this frequency at 2330-0045. (Silvi, OH)

1908 UTC on 7245

MAURITANIA: Radio Mauritanie. Tentatively Noukchott, switching from Arabic to vernacular harangue by two men interspersed with flutes and Koran readings. Buried at 2000 by co-channel sign-on. (Hill, MA/*TFW*)

2001 UTC on 7265

GERMANY: (Tent) Sudwestfunk. German DJ with pop/rock oldies from Crosby Stills & Nash, Buffalo Springfield and others. (Silvi, OH) Germany's *Bayerischer Rundfunk* heard in German on 6085.3 at 2154. (Schwartz, WI)

2030 UTC on 11804.98

BRAZIL: Radio Globo. Portuguese. Talk about soccer to canned ID breaks. Signal fade out at 2058. Additional Brazilians noted: **Radio Gaucha** on 11914.98 at 2100 with talk about city Florianopolis. **Radio Bandeirantes** 11925 at 2115; **Radio Clube Paranaense** 9725 at 2123. (Serra, Italy, *TFW*)

2200 UTC on 4770

NIGERIA: Radio Nigeria. Heavy interferences during *Tunes To Remember* program. Station ID and announcer chat. (Michalski, NY)

2238 UTC on 3234.8

PERU: Radio Luz y Sonido. Spanish. "Por Radio Luz y Sonido..la buena musica.." (Arrunategui, Peru, *TFW*)

2300 UTC on 7215

COTE D'IVOIRE: RTV Ivoirienne. French announcers with chat to program mix of pop/rock and regional French music. (Silvi, OH)

Thanks to our contributors — Have you sent in YOUR logs?
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I have taken this one step further. By writing a conventional reception report, I've made QSLing the "birds" an extension of my personal QSL collection.

Within my report I include the satellite name, transponder number, date, time (in EST), and details of the reception.

For a detailed synopsis of broadcasters via satellite, check out the *Satellite Service Guide* in *Satellite Times*, available from Grove Enterprises, P.O. Box 98, Brasstown, 28902

CUBA

Radio Havana, 9820 kHz. Full data QSL card unsigned. Personal letter signed by Lourdes Lopez-Correspondence Dept. Received in 94 days for an English report. Station address: Apartado 6240, Havana, Cuba (Rich Barners, via email)

GERMANY

Radio Liberty, 11970 kHz (via Holzkirchen, Germany) 9695 kHz (via Lampertheim, Germany). Full data *Letter of Verification* on Radio Liberty letterhead signed by David Walcutt-Broadcast Operations Liaison, plus business card. Received in 14 days for an English report of RL's Kazakh service, SASE (returned) and souvenir postcard. QSL address: 1201 Connecticut Ave., Washington, DC 20036. (Gayle Van Horn, Brasstown, NC)

KUWAIT

Radio Kuwait, 11990 kHz. Full data QSL folder card stamped with station seal, unsigned. Large souvenir tote bag enclosed. Received in 76 days for an English report and one U.S. dollar. Station address: Ministry of Information, Engineering Communications Dept., Controller of Frequency Management, P.O. Box 397, Safat 13004, Kuwait. (Brandon M. Artman, West Chester, PA)

MEDIUMWAVE

WAKK, 1140 kHz AM. Full data QSL letter signed by Richard Watts-Chief Engineer, plus hurricane map enclosed. Received in four days for an English AM report of special DX Test broadcast, and mint stamps. Station address: P.O. Box 1649, McComb, MS 39648. (Hank Holbrook, Dunkirk, MS)

WFNR, 710 kHz AM. Full data prepared QSL card returned as verified by Robert Travis. Received for an English AM report of special DX Test, and mint stamps. Station address: 485 Tower Road, Christianburg, VA 24073. (Holbrook, MD)

NEW ZEALAND

NZ Radio for the Print Disabled, 3935 kHz. Full data station logo QSL card signed by Brian Stoker-QSL Manager, plus color postcard. Received in 14 days for an English report and NZ currency. Station logged while on board the P.O. Lines Sky Princess in the South Pacific. Station address: P.O. Box 360, Levin, New Zealand. (David N. Klein, Danvers, MA)

NON-DIRECTIONAL BEACONS

6E, 387 kHz, Grand Mann, New Brunswick. Full data prepared QSL card returned and signed with illegible signature. Received for a followup reception report and mint stamps. Station address: Transport Canada, Flight Operations, P.O. Box 42, Moncton, NB Canada E1C 8K6. (Hank Holbrook, Dunkirk, MD)

7L, 405 kHz, La Sarre, Quebec. Full data prepared QSL card returned as verified by Jocelyn Caron. Pamphlet on the town enclosed with a copy of station license, noting power is 25 watts at 40 feet. Received for an English utility report and mint stamps. Station address: Ville de la Sarre (Aéroport), Directeur des travaux publics, 6, Avenue Est, La Sarre, Quebec J9Z 1J1 Canada. (Holbrook, MD)

YFH, 266 kHz, Fort Hope, Ontario. Full data QSL letter signed by B.M. Davies

Regional Director Technical Services. Noted station in operation since 1988 with 30.5m top loaded vertical radiator antenna. Received for an English utility report and mint stamps. Station address: Transport Canada, Technical Services Ontario Region, 4900 Yonge Street, Suite 300, Willowdale, Ontario M2N 6A5 Canada. (Holbrook, MD)

POLAND

Polish Radio Warsaw, 11815 kHz. Full data station QSL card unsigned. Souvenir postcard, broadcast schedule and dollar returned stating it was "not necessary." Personal letter enclosed with station tour invitation next time I visit Poland. Received in 71 days for an English report. Station address: c/o English Service, P.O. Box 46, 00-977 Warsaw, Poland. (Paul Jablonowski, Greenfield, WI)

SATELLITE SERVICES

KLON FM, C-band satellite service-domestic satellite Galaxy 5/transponder 2, audio subcarrier 5.58/5.76 MHz. Full data station logo card signed by Ron Thompson-Chief Engineer. Received in 35 days for an English report of broadcast via satellite and mint stamps. Station address: Cal State University-Long Beach, 1288 North Bellflower Blvd., Long Beach, CA 90815. (Van Horn, NC)

WCCO AM, C-band satellite service-domestic satellite Galaxy 6/transponder 15, audio subcarrier 6.20 MHz. Full data WCCO station logo card unsigned, plus *Minnesota's Good Neighbor* station newsletter. Received in 14 days for an English report of broadcast via satellite and mint stamps. Station address: 625 Second Avenue South, Minneapolis, MN 55402. (Van Horn, NC)

RTE-Radio Telefis Eireann via World Radio Network One. C-band satellite service-domestic satellite Galaxy 5/transponder 6, audio subcarrier 6.80 MHz. Full data Dublin GPO postcard signed by Wesley Boyd-Director of Broadcasting Developments. Personal letter from veri signer on RTE letterhead, and RTE satellite schedule brochures. Received in 25 days for an English report of broadcast via satellite on WRN. Station address: Donnybrook, Dublin 4, Ireland. (Van Horn, NC)

SHIP TRAFFIC

Norgas Transporter ELPW8, 16173.5 kHz. Full data prepared QSL card returned as verified. Received for an English utility report of SITOP traffic. Ship address: Chemikalien Seetransport GMBH, Mattenwiete 1, 2045 Hamburg, Germany. (Steve McDonald VE7SL, Mayne Bay, BC Canada via email)

M/V Iris Ace 3EAD9, 12438 kHz. Full data prepared QSL card returned as verified. Received in 120 days for an English utility report and CW traffic. Ship address: O.S.K. Lines, Shosen Mitsui Bldg., Box 5, 1-1, Toraoomon 2-chome, Minato-ku, Tokyo 105-91 Japan. (McDonald, CAN)

ST. HELENA

Radio St. Helena, 11092.5 kHz. Full station map/logo card signed by Tony Leo-Station Manager. Received in 69 days for an English report and two U.S. dollars. Station address: The Castle, Jamestown, St. Helena, South Atlantic Ocean. (Lee Banner, Fishkill, NJ) *DXers mark your calendars now ... Radio St. Helena returns October 26th 1997, on the station's 30th anniversary. -ed.*

HOW TO USE THE SHORTWAVE GUIDE

1: Convert your time to UTC.

Eastern and Pacific Times are already converted to Coordinated Universal Time (UTC) at the top of each page. The rule is: convert your local time to 24-hour format; add (during Daylight Savings Time) 4, 5, 6, or 7 hours for Eastern, Central, Mountain or Pacific Times, respectively.

Note that all dates, as well as times, are in UTC; for example, a show which might air at 0030 UTC Sunday will be heard on Saturday evening in America (8:30 pm Eastern, 5:30 pm Pacific).

2: Choose a program or station you want to hear.

Some selected programs appear on the lower half of the page for prime listening hours—space does not permit 24-hour listings.

Occasionally program listings will be followed by "See X 0000." This information indicates that the program is a rerun, and refers to a previous summary of the program's content. The letter stands for a day of the week, as indicated below, and the four digits represent a time in UTC.

S: Sunday T: Tuesday H: Thursday A: Saturday
M: Monday W: Wednesday F: Friday

3: Find the frequencies for the program or station you want to hear.

Look at the page which corresponds to the time you will be listening. Comprehensive frequency information for English broadcasts can be found at the top half of the page. All frequencies are in kHz.

The frequency listing uses the same day codes as the program listings; if a broadcast is not daily, those day codes will appear before the

station name. Irregular broadcasts are indicated "tent" and programming which includes languages besides English are coded "v" (various languages).

4: Choose the most promising frequencies for the time, location and conditions.

Not all stations can be heard and none all the time on all frequencies. To help you find the most promising frequency, we've included information on the target area of each broadcast. Frequencies beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible. Every frequency is followed by one of these target codes:

am: The Americas	as: Asia
na: North America	au: Australia
ca: Central America	pa: Pacific
sa: South America	va: various
eu: Europe	do: domestic broadcast
af: Africa	om: omnidirectional
me: Middle East	

Consult the propagation charts. To further help you find the right frequency, we've included charts at the back of this section which take into account conditions affecting the audibility of shortwave broadcasts. Simply pick out the region in which you live and find the chart for the region in which the station you want to hear is located. The chart indicates the optimum frequencies for a given time in UTC.

HOT NEWS

PROGRAMMING TIPS BY JIM FRIMMEL

THE BBC IN TRANSITION

The ongoing privatization of the BBC that began late last year resulted in the sale of four World Service transmitter stations in the UK (Skelton, Rampisham, Woofferton, and Oxfordness). A new R&D strategy has developed which ultimately should result in: (1) A 24-hour news service addition to the World Service, (2) a DAB service for European cities, (3) new foreign language services via the internet, and (4) the acquiring of new AM/FM outlets to expand listenership.

The March issue of *BBC On Air Magazine* promised lots of new and exciting programs beginning in April on the BBC World Service. Look for these changes in our May issue, as well as a background article on the BBC today.

CANADA TWO WAYS

The Canadian Broadcasting Corp. (CBC) is now simulcasting its broadcasts via the internet. Both CBC Radio and CBC Stereo can be heard in real-time (www.radio.cbc.ca/realaudio.html). Archived programs are also available. Sound

quality is excellent. In other CBC news, Canada's heritage minister, Sheila Copps, said that once the latest round of federal budget cuts is complete, the CBC will be "guaranteed stable funding for five years." If true, this would assure the continuation of RCI.

AMERICAN POTPOURRI

World Harvest Radio now simulcasts its shortwave output via its web site (www.whri.com/realaudio.htm). Angels 1 and 2 from Indiana (WHRI) and Angel 3 from Hawaii (KWHI) can all be heard.

There was no need to wait until the beginning of DST to begin using Monitor Radio International's new frequencies. Their changeover for the summer months began on March 4th and runs until September 1st, with some frequency changes occurring on May 6th.

Chuck Harder's radio program *For the People* is back on shortwave via WHRI (Angel 1) from 1800-2100 UTC (M-F) on 9495 kHz. Chuck's People's Network was taken over by the United Broadcasting Network last year and Chuck's program was replaced by Bay Buchanan and other talk show

personalities. Hour two of his 3-hour program can also be heard on WWCR #1 at 0500 UTC (M-F) (3210 kHz), and hour three via WWCR #3 at 2000 UTC (M-F) (12160 kHz).

Don't bother to check Voice of America's FTP site for program information about VOA English broadcasts. Despite the many changes which have occurred, the on-line documents haven't been updated since 1995.

WORLD RADIO NETWORK NEWS

The WRN lost nine of its affiliated broadcasters in February. Stations which decided not to rejoin WRN were Blue Danube Radio, Radio Canada International (RCI), Radio France International (RFI), Radio Korea International (RKI), Radio Prague, Radio Romania International (RRI), Radio Sweden, RTHK Hong Kong, and United Nations Radio. RCI, RFI, Radio Sweden, and RTHK Hong Kong now offer RealAudio service on their own web pages.

VIDEO ON THE INTERNET

Progressive Networks, Inc. released new public beta software

for playing both video and audio via the internet. The jump from RealAudio 3.0 to the new software necessitated a name change to RealPlayer 4.0 (beta 1) to accommodate the incorporation of video play.

Download the player from www.real.com and check out the guide to what's on the air at www.timecast.com/fchannels.html. Also visit the European showcase at www.europe.real.com for RealVideo samples from BBC-TV, and other clips from UK, Italy, France, Finland, and Sweden. On the other side of the planet at www.jp.real.com are some clips from Japan. And, by the time you read this, there undoubtedly will be new additions from all over.



FREQUENCIES

0000-0100	Anguilla, Caribbean Beacon	6090am			0000-0030	Thailand, Radio	9680af			
0000-0030	Australia, Radio	13605pa	15510as	17750as	0000-0100	Ukraine, R Ukraine Intl	5915na	7150na	7160na	7205na
0000-0100 vl	Australia, VLBK Katherine	5025do					7290na			
0000-0100 vl	Australia, VL8T Tent Crk	4910do			0000-0100	United Kingdom, BBC WS	5965as	5970am	5975am	6175am
0000-0015	Cambodia, Natl Voice of	11940as					6195as	9410as	9515am	9590am
0000-0100	Canada, CBC N Quebec Svc	9625do					9915am	11750sa	11955as	15280as
0000-0100	Canada, CFCX Montreal	6005do					15360as			
0000-0100	Canada, CFXR Toronto	6070do			0000-0030	United Kingdom, BBC WS	7110as	9580as	11945as	
0000-0100	Canada, CFVP Calgary	6030do			0000-0100	USA, KAIJ Dallas TX	5810am			
0000-0100	Canada, CHNX Halifax	6130do			0000-0100	USA, KTBN Salt Lk City UT	7510am			
0000-0100	Canada, CKZN St John's	6160do			0000-0100	USA, KWHR Naalehu HI	17510as			
0000-0100	Canada, CKZU Vancouver	6160do			0000-0100	USA, Monitor Radio Intl	7535na	9430sa	15665as	15725as
0000-0100	Canada, R Canada Intl	5960am	9755am		0000-0100	USA, Voice of America	7215as	9890as	11760as	15290am
0000-0030	Canada, R Canada Intl	6040am	9535am	11940am			17735am	17820as		
0000-0100	China, China Radio Intl	9710na	11695na	11760na	0000-0100 tw/fra	USA, Voice of America	5995am	6130am	7405am	9455am
0000-0100 vl	Costa Rica, Adv World R	7375am	9725am	13750am			9775am	13740am		
0000-0100	Costa Rica, RF Peace Intl	6205am	7385am	15460am			5825eu	6890na	7425na	
0000-0010	Croatia, Croatian Radio	5895eu	7165eu		0000-0100	USA, WGTG McCaysville GA	5085am			
0000-0027	Czech Rep, Radio Prague	6200na	7345na		0000-0100	USA, WHRI Noblesville IN	5745am			
0000-0100	Ecuador, HCJB	9745am	21455am		0000-0100	USA, WJCR Upton KY	7490na			
0000-0030	Egypt, Radio Cairo	9900na			0000-0100 m	USA, WRMI/R Miami Intl	9955am			
0000-0015 vl	Ghana, Ghana Broadc Corp	3366do	4915do		0000-0100	USA, WRNO New Orleans LA	7355am			
0000-0045	India, All India Radio	7150as	9705as	9950as	0000-0100	USA, WWCR Nashville TN	2390am	3215am	5070am	5935am
0000-0030	Kazakhstan, Radio Almaty	6230eu		11620as	0000-0100	USA, WYFR Okeechobee FL	6065na	9505na		
0000-0100	Lebanon, Voice of Hope	9960va			0030-0100	Australia, Radio	9660pa	11640as	12080pa	13605pa
0000-0100	Liberia, LCN/R Liberia Int	5100do					13755pa	15365pa	17715as	17750as
0000-0100	Malaysia, Radio	7295do					17795pa	17860pa		
0000-0100 vl	Malaysia, RTM Kuching	7160do			0030-0055	Austria, R Austria Intl	7325na			
0000-0100	Netherlands, Radio	6020na	6165na		0030-0100	Iran, VOIRI	6050na	9022na	9685na	
0000-0100	New Zealand, R NZ Intl	15115pa			0030-0100	Netherlands, Radio	5905as	7305as		
0000-0050	North Korea, R Pyongyang	11335na	13760na	15130na	0030-0100	Sri Lanka, Sri Lanka BC	9730as			
0000-0100 vl	Papua New Guinea, NBC	9675do			0030-0100	Sweden, Radio	6065am			
0000-0100	Russia, Voice of Russia WS	7105na	7125na	7240na	0030-0100	Thailand, Radio	9655as	11905as		
0000-0030 mtw/fra	Serbia, Radio Yugoslavia	6195na	7115na	9550na	0035-0040	India, All India Radio	4860do	5050do	7110do	11830do
0000-0100	Spain, R Exterior Espana	6055am			0050-0100	Italy, RAI Intl	6010na	9675na	11800na	

SELECTED PROGRAMS

Sundays

- 0000 Spain, R Exterior de Espana: News. A ten-minute summary of world news.
- 0000 USA, KTBN Salt Lk City UT: A Call to Action. Jay Sekulow takes an in-depth look at law and justice issues facing Christians.
- 0000 USA, WGTG McCaysville GA: Sound of the Trumpet. No information available.
- 0011 Spain, R Exterior de Espana: Cultural Encounters. Highlighting cultural interaction between Spain and North America.
- 0027 Spain, R Exterior de Espana: Distance Unknown. A program for shortwave listeners and DXers.
- 0030 Sweden, Radio: Spectrum (1). Sarah Roxstrom with the latest on Swedish music, drama, art, and film.
- 0030 USA, KTBN Salt Lk City UT: In Touch. The Atlanta Bible-teaching ministry of Charles Stanley.
- 0036 Spain, R Exterior de Espana: Spanish Poparama. The latest pop music hits in Spain as well as some oldies.
- 0056 Spain, R Exterior de Espana: Program Announcements. Descriptions of Spanish National Radio's programs and schedule information.

Mondays

- 0000 Spain, R Exterior de Espana: News. See S 0000.
- 0000 USA, WGTG McCaysville GA: The Domestic SW Report. Bill Lauterbach with news about America shortwave stations, programs, and personalities.
- 0000 USA, WRMI/R Miami Intl, FL: Church of Christ. Religious.
- 0011 Spain, R Exterior de Espana: Visitors Book. Who's visiting Spain this week.
- 0015 USA, WRMI/R Miami Intl, FL: Truth for the World. Churches of Christ spokesman Jim Dearman examines Scripture.
- 0022 Spain, R Exterior de Espana: Spanish Echoes. Music with a Spanish accent.
- 0030 Sweden, Radio: In Touch with Stockholm (biweekly). See S 1230.
- 0030 Sweden, Radio: Sounds Nordic (biweekly). See S 1230.
- 0030 USA, KTBN Salt Lk City UT: Taking Authority. Bishop Eddie Long preaches from Atlanta, Georgia.
- 0030 USA, WGTG McCaysville GA: Voice in the Wilderness. Denny Corbin evangelizes from Oregon.
- 0030 USA, WRMI/R Miami Intl, FL: Exceeding Faith. See S 1615.
- 0038 Spain, R Exterior de Espana: Radio Club. Listener letters are answered and music requests played.
- 0045 USA, WRMI/R Miami Intl, FL: Strength for Today. Lane Brown evangelizes from New Mexico.

Tuesdays

- 0000 Spain, R Exterior de Espana: The News from Spain. A half-hour of news about Spain, Europe, and the world. The Spanish weather and cultural scene are also featured.
- 0000 USA, KTBN Salt Lk City UT: Gospel America. See S 0300.
- 0000 USA, WGTG McCaysville GA: The Baker Report. See M 2300.
- 0000 USA, WRMI/R Miami Intl, FL: Herald of Truth. Bible-based solutions to personal and national problems.
- 0015 USA, WRMI/R Miami Intl, FL: Viva Miami!. See M 1430.
- 0030 Sweden, Radio: Sixty Degrees North. See M 1230.
- 0030 USA, KTBN Salt Lk City UT: A Call to Action. See S 0000.
- 0032 Spain, R Exterior de Espana: Spanish Music. Popular music currently heard in Spain.
- 0036 Spain, R Exterior de Espana: Press Review. Review of the Spanish and international press.
- 0041 Spain, R Exterior de Espana: Entertainment in Spain. Current favorites and personalities from the world of stage and screen.
- 0045 WRMI/R Miami Intl: Words of the Spirit. See M 1345.
- 0048 Sweden, Radio: SportScan. See M 1246.
- 0051 Spain, R Exterior de Espana: Spanish Course by Radio. A course in Spanish with English commentary.

Wednesdays

- 0000 Spain, R Exterior de Espana: The News from Spain. See T 0000.
- 0000 USA, KTBN Salt Lk City UT: Behind the Scenes. See S 0500.
- 0000 WGTG McCaysville GA: Baker Report. See M 2300.
- 0000 USA, WRMI/R Miami Intl, FL: Herald of Truth. See T 0000.
- 0015 USA, KTBN Salt Lk City UT: Principles of Biblical Economics. John Avanzini teaches prosperity.
- 0015 USA, WRMI/R Miami Intl, FL: Viva Miami!. See M 1430.
- 0025 USA, KTBN Salt Lk City UT: The Word. Efreim Zimbalist Jr. reads from Scripture.
- 0030 Spain, R Exterior de Espana: Spanish Music. See T 0032.
- 0030 Sweden, Radio: Sixty Degrees North. See M 1230.
- 0030 USA, KTBN Salt Lk City UT: Up on Melody Mountain. Betty Jean Robinson sings in Brentwood, Tennessee.
- 0034 Spain, R Exterior de Espana: Press Review. See T 0036.
- 0039 Spain, R Exterior de Espana: Kaleidoscope. Spanish cultural life both in Spain and abroad.
- 0045 WRMI/R Miami Intl: Words of the Spirit. See M 1345.
- 0046 Sweden, Radio: MediaScan (1/3). See T 1246.

Thursdays

- 0000 Spain, R Exterior de Espana: The News from Spain. See T 0000.

- 0000 USA, KTBN Salt Lk City UT: Behind the Scenes. See S 0500.
- 0000 USA, WGTG McCaysville GA: The Baker Report. See M 2300.
- 0000 USA, WRMI/R Miami Intl, FL: Herald of Truth. See T 0000.
- 0015 USA, KTBN Salt Lk City UT: Principles of Biblical Economics. See W 0015.
- 0015 USA, WRMI/R Miami Intl, FL: Viva Miami!. See M 1430.
- 0025 USA, KTBN Salt Lk City UT: The Word. See W 0025.
- 0030 Spain, R Exterior de Espana: Spanish Music. See T 0032.
- 0030 Sweden, Radio: Sixty Degrees North. See M 1230.
- 0030 USA, KTBN Salt Lk City UT: Changing Your World. See M 0530.
- 0034 Spain, R Exterior de Espana: Press Review. See T 0036.
- 0040 Spain, R Exterior de Espana: Window on Spain. A different region of Spain and its attractions are highlighted each week.
- 0045 USA, WRMI/R Miami Intl, FL: Words of the Spirit. See M 1345.
- 0046 Sweden, Radio: Money Matters. See W 1246.

Fridays

- 0000 Spain, R Exterior de Espana: The News from Spain. See T 0000.
- 0000 USA, KTBN Salt Lk City UT: Behind the Scenes. See S 0500.
- 0000 USA, WGTG McCaysville GA: The Baker Report. See M 2300.
- 0000 USA, WRMI/R Miami Intl, FL: Herald of Truth. See T 0000.
- 0015 USA, WRMI/R Miami Intl, FL: Viva Miami!. See M 1430.
- 0030 Spain, R Exterior de Espana: Press Review. See T 0036.
- 0030 Sweden, Radio: Sixty Degrees North. See M 1230.
- 0030 USA, KTBN Salt Lk City UT: In the Name of Satan. Bob Larson fights satanism and the occult.
- 0036 Spain, R Exterior de Espana: Radio Club. See M 0038.
- 0043 Sweden, Radio: GreenScan. See H 1243.
- 0045 USA, WRMI/R Miami Intl, FL: Words of the Spirit. See M 1345.
- 0046 Sweden, Radio: Horizon (4/5). See H 1246.

Saturdays

- 0000 Spain, R Exterior de Espana: The News from Spain. See T 0000.
- 0000 USA, KTBN Salt Lk City UT: Behind the Scenes. See S 0500.
- 0000 USA, WGTG McCaysville GA: The Baker Report. See M 2300.
- 0000 USA, WRMI/R Miami Intl, FL: Herald of Truth. See T 0000.
- 0015 USA, KTBN Salt Lk City UT: Principles of Biblical Economics. See W 0015.
- 0015 USA, WRMI/R Miami Intl, FL: Viva Miami!. See M 1430.
- 0025 USA, KTBN Salt Lk City UT: The Word. See W 0025.
- 0030 Spain, R Exterior de Espana: Spanish Music. See T 0032.
- 0030 Sweden, Radio: Sixty Degrees North. See M 1230.
- 0030 USA, KTBN Salt Lk City UT: The Laverne Tripp Family. See W 1100.
- 0033 Spain, R Exterior de Espana: Press Review. See T 0036.
- 0035 Sweden, Radio: A Review of the Newsweek. See F 1235.
- 0038 Spain, R Exterior de Espana: Review of the Arts. A review of cultural activities in Spain and elsewhere.
- 0045 USA, WRMI/R Miami Intl, FL: Words of the Spirit. See M 1345.

FREQUENCIES

0100-0200	Australia, Radio	9660pa	11640as	13755pa	15240pa	0100-0130	Slovakia, R Slovakia Intl	5930na	7300na	9440na
		15365pa	15415as	15510as	17715as	0100-0200	Spain, R Exterior Espana	6055am		
		17750pa	17795pa	17880pa		0100-0200	Sri Lanka, Sri Lanka BC	9730as		
0100-0200 vl	Australia, VL8K Katherine	5025do				0100-0130	Switzerland, Swiss R Intl	6135na	9885na	9905ca
0100-0200 vl	Australia, VL8T Tent Crk	4910do				0100-0200	United Kingdom, BBC WS	5965as	5970sa	5975am
0100-0200 vl	Canada, CBC N Quebec Svc	9625do						6195as	9410as	9515am
0100-0200	Canada, CFCX Montreal	6005do						9915am	11750am	11955as
0100-0200	Canada, CFRX Toronto	6070do						15360as		
0100-0200	Canada, CFVP Calgary	6030do				0100-0200	USA, KAIJ Dallas TX	5810am		
0100-0200	Canada, CHNX Halifax	6130do				0100-0200	USA, KTNB Salt Lk City UT	7510am		
0100-0200	Canada, CKZN St John's	6160do				0100-0200	USA, KVOH Los Angeles CA	9975am		
0100-0200	Canada, CKZU Vancouver	6160do				0100-0200	USA, KWHR Naalehu HI	17510au		
0100-0200	Costa Rica, RF Peace Intl	6205am	7385am			0100-0200	USA, Monitor Radio Intl	7535na	9430am	
0100-0110	Croatia, Croatian Radio	5895eu	7165eu			0100-0200	USA, Voice of America	7115as	7205as	9455am
0100-0200	Cuba, Radio Havana	6000na	9820na	9830na				11705as	15250as	15370as
0100-0200	Ecuador, HCJB	9745am	21455am					17820as	21550as	
0100-0150	Germany, Deutsche Welle	5960na	6040na	6085na	6145na	0100-0200 twtfa	USA, Voice of America	5995am	6130am	7405am
		9640na						13740am		9775am
0100-0115	Ghana, Ghana Broadc Corp	3366do	4915do			0100-0200	USA, WEWN Birmingham AL	5825eu	6890na	7425na
0100-0130	Hungary, Radio Budapest	5905na	9840na			0100-0200	USA, WGTG McCaysville GA	5085am		7520sa
0100-0200	Indonesia, Voice of	9525na				0100-0200	USA, WHRI Noblesville IN	5745am		
0100-0128	Iran, VOIRI	6050na	9022na			0100-0200	USA, WJCR Upton KY	7490na		
0100-0200 th	Ireland, W Coast R Ireland	5910am				0100-0200 m-a/vl	USA, WRMI/R Miami Intl	9955am		
0100-0110	Italy, RAI Intl	6010na	9675na	11800na		0100-0200	USA, WRNO New Orleans LA	7355am		
0100-0200	Japan, R Japan/NHK World	11790as	11840as	11860as	11890na	0100-0200 mtwhf	USA, WVHA Greenbush ME	5850eu		
		13630am	13650as	15475as	17685as	0100-0200	USA, WWCN Nashville TN	2390am	3215am	5070am
		17810as				0100-0200	USA, WYFR Okeechobee FL	6065na	9505na	
0100-0200	Lebanon, Voice of Hope	9960va				0100-0130	Uzbekistan, R Tashkent	5955eu	5975eu	7285eu
0100-0200	Liberia, LCN/R Liberia Int	5100do				0100-0126	Vietnam, Voice of	5940na		
0100-0200 smtwh	Malaysia, Radio	7295do				0115-0130 f	Greece, Voice of	6260na	7450na	9425na
0100-0125	Netherlands, Radio	6020na	6165na			0130-0150	Greece, Voice of	6260na	7450na	9425na
0100-0200	Netherlands, Radio	5905as	7305as			0130-0200 s/vl	Malta, VO Mediterranean	15550as	17570au	
0100-0200	New Zealand, R NZ Intl	15115pa				0130-0200	Netherlands, Radio	9860as	11655as	
0100-0200 vl	Papua New Guinea, NBC	9675do				0130-0200	Sweden, Radio	7265am	7290am	
0100-0200	Philippines, FEBC/R Intl	15450as				0130-0156	Vietnam, Voice of	5940na		
0100-0200	Russia, Voice of Russia WS	5930na	7105na	7345na	9550na	0140-0200	Vatican State, Vatican R	5980as	7335as	
		5980na	12030na	13665na		0145-0200	Albania, R Tirana Intl	6115na	7160na	
0100-0200 mtwhf	Russia, Voice of Russia WS	5920na				0145-0200	USA, WYFR Okeechobee FL	9355eu		
0100-0130	Serbia, Radio Yugoslavia	6195na	7130na			0150-0200	Germany, Deutsche Welle	5960na	6085na	

SELECTED PROGRAMS

Sundays

- 0100 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0100 Spain, R Exterior de Espana: News. See S 0000.
- 0100 USA, KTNB Salt Lk City UT: The Hour of Power. Robert Schuller conducts services from the Crystal Cathedral.
- 0100 USA, WGTG McCaysville GA: The News and Prophecy Forum. Jack Frost preaches end time prophecy in the light of current events.
- 0111 Spain, R Exterior de Espana: Cultural Encounters. See S 0011.
- 0127 Spain, R Exterior de Espana: Distance Unknown. See S 0027.
- 0130 Sweden, Radio: Spectrum (1). See S 0030.
- 0136 Spain, R Exterior de Espana: Spanish Poparama. See S 0036.
- 0140 Vatican State, Vatican Radio: Liturgical Reflection. Discussion of a topic from church liturgy.
- 0152 Vatican State, Vatican Radio: News. A bulletin of international news.

Mondays

- 0100 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0100 Spain, R Exterior de Espana: News. See S 0000.
- 0100 USA, WGTG McCaysville GA: The Gethsemane Hour. The voice of the Anabaptists from Lexington, South Carolina.
- 0100 USA, WRMI/R Miami Intl, FL: Crown of Life. See S 1615.
- 0111 Spain, R Exterior de Espana: Visitors Book. See M 0011.
- 0115 USA, WRMI/R Miami Intl, FL: Christ Gospel Broadcast. BR Hicks of Indiana with a Bible lesson.
- 0122 Spain, R Exterior de Espana: Spanish Echoes. See M 0022.
- 0130 Sweden, Radio: In Touch with Stockholm (biweekly). See S 1230.
- 0130 Sweden, Radio: Sounds Nordic (biweekly). See S 1230.
- 0130 USA, WRMI/R Miami Intl, FL: The Final Crisis. See M 0000.
- 0138 Spain, R Exterior de Espana: Radio Club. See M 0038.
- 0140 Vatican State, Vatican Radio: Focus on the Church. See S 1550.
- 0152 Vatican State, Vatican Radio: News. See S 0152.

Tuesdays

- 0100 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0100 Spain, R Exterior de Espana: The News from Spain. See T 0000.

- 0100 USA, KTNB Salt Lk City UT: Benny Hinn. Evangelizing and healing by Benny Hinn from the Orlando Christian Center.
- 0100 USA, WGTG McCaysville GA: Radio Free World. What's happening and where with Anthony J. Hilder.
- 0130 Sweden, Radio: Sixty Degrees North. See M 1230.
- 0132 Spain, R Exterior de Espana: Spanish Music. See T 0032.
- 0136 Spain, R Exterior de Espana: Press Review. See T 0036.
- 0140 Vatican State, Vatican Radio: Focus on the Church. See S 1550.
- 0141 Spain, R Exterior de Espana: Entertainment in Spain. See T 0041.
- 0147 Sweden, Radio: SportScan. See M 1246.
- 0151 Spain, R Exterior de Espana: Spanish Course by Radio. See T 0051.
- 0152 Vatican State, Vatican Radio: News. See S 0152.

Wednesdays

- 0100 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0100 Spain, R Exterior de Espana: The News from Spain. See T 0000.
- 0100 USA, KTNB Salt Lk City UT: Up on Melody Mountain. See W 0030.
- 0100 USA, WGTG McCaysville GA: Radio Free World. See T 0100.
- 0100 USA, WRMI/R Miami Intl, FL: The Voice of Reform. Tony Hernandez of the Florida branch of Ross Perot's Reform Party hosts this program.
- 0130 Spain, R Exterior de Espana: Spanish Music. See T 0032.
- 0130 Sweden, Radio: Sixty Degrees North. See M 1230.
- 0130 USA, KTNB Salt Lk City UT: Cornerstone. See S 1200.
- 0134 Spain, R Exterior de Espana: Press Review. See T 0036.
- 0139 Spain, R Exterior de Espana: Kaleidoscope. See W 0039.
- 0146 Sweden, Radio: MediaScan (1/3). See T 1246.
- 0147 Spain, R Exterior de Espana: Spanish Course by Radio. See T 0051.
- 0152 Vatican State, Vatican Radio: News. See S 0152.

Thursdays

- 0100 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0100 Spain, R Exterior de Espana: The News from Spain. See T 0000.
- 0100 USA, KTNB Salt Lk City UT: Precious Memories. Bill Gaither.
- 0100 USA, WGTG McCaysville GA: Radio Free World. See T 0100.
- 0130 Spain, R Exterior de Espana: Spanish Music. See T 0032.

- 0130 Sweden, Radio: Sixty Degrees North. See M 1230.
- 0130 USA, KTNB Salt Lk City UT: Jack Van Impe Presents. See T 0500.
- 0133 Spain, R Exterior de Espana: Press Review. See T 0036.
- 0139 Spain, R Exterior de Espana: Window on Spain. See H 0040.
- 0140 Vatican State, Vatican Radio: News of the Church. See S 0333.
- 0145 Vatican State, Vatican Radio: Mailbox. See W 1555.
- 0146 Sweden, Radio: Money Matters. See W 1246.
- 0149 Spain, R Exterior de Espana: Spanish Course by Radio. See T 0051.
- 0152 Vatican State, Vatican Radio: News. See S 0152.

Fridays

- 0100 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0100 Spain, R Exterior de Espana: The News from Spain. See T 0000.
- 0100 USA, KTNB Salt Lk City UT: Get Ready. See M 2330.
- 0100 USA, WGTG McCaysville GA: Radio Free World. See T 0100.
- 0130 Spain, R Exterior de Espana: Press Review. See T 0036.
- 0130 Sweden, Radio: Sixty Degrees North. See M 1230.
- 0130 USA, KTNB Salt Lk City UT: Lakewood Church. John Osteen preaches from Houston, Texas.
- 0136 Spain, R Exterior de Espana: Radio Club. See M 0038.
- 0143 Sweden, Radio: GreenScan. See H 1243.
- 0146 Sweden, Radio: Horizon (4/5). See H 1246.
- 0148 Spain, R Exterior de Espana: Spanish Course by Radio. See T 0051.
- 0152 Vatican State, Vatican Radio: News. See S 0152.

Saturdays

- 0100 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0100 Spain, R Exterior de Espana: The News from Spain. See T 0000.
- 0100 USA, KTNB Salt Lk City UT: Ever Increasing Faith. Dr. Frederick K.C. Price evangelizes.
- 0100 USA, WGTG McCaysville GA: Radio Free World. See T 0100.
- 0130 Spain, R Exterior de Espana: Spanish Music. See T 0032.
- 0130 Sweden, Radio: Sixty Degrees North. See M 1230.
- 0133 Spain, R Exterior de Espana: Press Review. See T 0036.
- 0135 Sweden, Radio: A Review of the Newsweek. See F 1235.
- 0138 Spain, R Exterior de Espana: Review of the Arts. See A 0038.
- 0140 Vatican State, Vatican Radio: News from the African Church. See M 0320.
- 0148 Spain, R Exterior de Espana: Spanish Course by Radio. See T 0051.
- 0152 Vatican State, Vatican Radio: News. See S 0152.

FREQUENCIES

0200-0300	Anguilla, Caribbean Beacon	6090am				0200-0300	Slovakia, Adv World Radio	11610as			
0200-0300 1-th/vl	Argentina, RAE	11710am				0200-0300	South Korea, R Korea Intl	7275as	11725am	11810am	15575am
0200-0300	Australia, Radio	9660pa	11640as	11695as	12080pa	0200-0300	Sri Lanka, Sri Lanka BC	9730as			
		13605pa	13755pa	15240pa	15365pa	0200-0300	Taiwan, VO Free China	5950na	7130as	9680na	11740ca
		15415as	17715as	17750pa	17795pa			11825as	15345as		
		17880pa				0200-0300	Ukraine, R Ukraine Intl	5915na	7150na	7180na	
0200-0300 vl	Australia, VL8K Katherine	5025do				0200-0300	United Kingdom, BBC WS	5970sa	5975am	6135af	6175am
0200-0300 vl	Australia, VL8T Tent Crk	4910do						9410na	9515am	9590am	9605as
0200-0300	Canada, CBC N Quebec Svc	9625do						9915as	11955as	15280as	15360as
0200-0300	Canada, CFCX Montreal	6005do				0200-0300	USA, KAIJ Dallas TX	5810am			
0200-0300	Canada, CFRX Toronto	6070do				0200-0300	USA, KLTN Salt Lk City UT	7510am			
0200-0300	Canada, CFVP Calgary	6030do				0200-0300	USA, KVOH Los Angeles CA	9975am			
0200-0300	Canada, CHNX Halifax	6130do				0200-0300	USA, KWHR Naalehu HI	17510au			
0200-0300	Canada, CKZN St John's	6160do				0200-0300	USA, Monitor Radio Intl	5850na	7535am		
0200-0300	Canada, CKZU Vancouver	6160do				0200-0300	USA, Voice of America	7115as	7205as	9740as	11705as
0200-0300	Canada, R Canada Intl	5765am	6010am	6155am	9535am			15250as	15370as	17740as	21550as
		9755am	11725am			0200-0300	USA, WEWN Birmingham AL	5825eu	6890na	7425na	
0200-0300	Costa Rica, RF Peace Intl	6205am	7385am			0200-0300	USA, WGTG McCaysville GA	5085am			
0200-0210	Croatia, Croatian Radio	5895eu	7165eu			0200-0300	USA, WHRI Noblesville IN	5760am	7315am		
0200-0300	Cuba, Radio Havana	6000na	9820na	9830na		0200-0300	USA, WJCR Upton KY	7490na			
0200-0227	Czech Rep, Radio Prague	5930na	7345na			0200-0300 m	USA, WRMI/R Miami Intl	9955am			
0200-0300	Ecuador, HCJB	9745am	21455am			0200-0300	USA, WWCN Nashville TN	2390am	3215am	5070am	5935am
0200-0300	Egypt, Radio Cairo	9475na				0200-0300	USA, WYFR Okeechobee FL	6065na	9505na		
0200-0250	Germany, Deutsche Welle	6035as	7265as	7285as	7355as	0200-0245	USA, WYFR Okeechobee FL	9355eu			
		9515as	9615as			0200-0226	Vietnam, Voice of	5940na			
0200-0300 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do		0215-0225	Nepal, Radio	7165do			
0200-0300	Lebanon, Voice of Hope	9960va				0230-0300	Albania, R Tirana Intl	6140na	7160na		
0200-0300 smtwh	Malaysia, Radio	7295do				0230-0259	Austria, R Austria Intl	7325na	9495sa	9870ca	
0200-0230 s/vl	Malta, VO Mediterranean	15550as	17570au			0230-0257	Czech Rep, Radio Prague	7350as			
0200-0300	Netherlands, Radio	9860as	11655as			0230-0300	Hungary, Radio Budapest	6195na	9840na		
0200-0225	Netherlands, Radio	5905as	7305as			0230-0300 vl	Philippines, R Pilipinas	11805me	15120me		
0200-0300	New Zealand, R NZ Intl	15115pa				0230-0255	S Africa, Investment Ch	6195me	7175me		
0200-0230 m	Norway, Radio Norway Intl	7125as	7440na	7465na		0230-0300	Sweden, Radio	6200na			
0200-0300 vl	Papua New Guinea, NBC	9675do				0230-0300	United Kingdom, BBC WS	7325am			
0200-0300	Philippines, FEBC/R Intl	15450as				0230-0256	Vietnam, Voice of	5940na			
0200-0300	Romania, R Romania Intl	5990na	6155na	9510na	9570na	0230-0300 vl	Zambia, R Zambia/ZNBC 2	6165do			
		11940na				0245-0300	India, All India Radio	3945do	6045do	7110do	11830do
0200-0300	Russia, Voice of Russia WS	5930na	5940na	6150na	7105na			15135do			
		7175na	7345na	9580na		0245-0300	United Kingdom, BBC WS	15405as			
0200-0300 mtwhfa	Russia, Voice of Russia WS	5920na				0250-0300	Vatican State, Vatican R	6095na	7305na		
0200-0225	S Africa, Investment Ch	6195me	7175me			0255-0300 vl	Zambia, R Zambia/ZNBC 1	4910do			

SELECTED PROGRAMS

Sundays

- 0200 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0200 USA, KLTN Salt Lk City UT: Carman, Helping youth to think through problems and find positive answers.
- 0200 USA, Monitor Radio Intl: Bible Lesson, Lesson-sermons from the King James Version of the Bible and Mary Baker Eddy's textbook.
- 0200 USA, WGTG McCaysville GA: World of Prophecy, Texe Marrs and a guest discuss the evils and pitfalls of today and the outlook for tomorrow.
- 0230 Sweden, Radio: Spectrum (1). See S 0030.
- 0230 USA, KLTN Salt Lk City UT: Eastman Curtis Live. A youth-oriented program.
- 0250 Vatican State, Vatican Radio: With Heart and Mind. How this week's liturgical readings apply to our everyday lives.
- 0258 Vatican State, Vatican Radio: On-the-Air. A preview of upcoming programs and broadcast changes and a look behind-the-scenes at Vatican Radio.

Mondays

- 0200 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0200 USA, KLTN Salt Lk City UT: Praise the Lord. Music, talk, and guest evangelists from the PTL Network.
- 0200 USA, Monitor Radio Intl: Sunday from the Mother Church, From the First Church of Christ, Scientist, in Boston, MA, USA.
- 0230 Sweden, Radio: In Touch with Stockholm (biweekly). See S 1230.
- 0230 Sweden, Radio: Sounds Nordic (biweekly). See S 1230.
- 0250 Vatican State, Vatican Radio: The Pope and the People. Recent public statements by the Pope and responses from the man on the street.

Tuesdays

- 0200 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0200 USA, KLTN Salt Lk City UT: Praise the Lord (live). See M 0200.
- 0200 USA, Monitor Radio Intl: Monitor Radio News. Five minutes of the latest world news at the beginning of the hour.
- 0200 USA, WGTG McCaysville GA: Radio Free World. See T 0100.

- 0206 USA, Monitor Radio Intl: Monitor Radio International. News, analysis, commentary, interviews and features in a magazine format.
- 0230 Sweden, Radio: Sixty Degrees North. See M 1230.
- 0248 Sweden, Radio: SportScan. See M 1246.
- 0249 USA, Monitor Radio Intl: Letterbox. Listeners make their views known by telephone or letter to host Lisa Dale.
- 0250 Vatican State, Vatican Radio: A Room with a View of the Vatican. A look at the activities of the Catholic Church in Rome.
- 0252 USA, Monitor Radio Intl: Religious Article from the CSM. As published in the Christian Science Monitor.
- 0255 Vatican State, Vatican Radio: As Romans Turn. Focusing on religious and other events in the eternal city.

Wednesdays

- 0200 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0200 USA, KLTN Salt Lk City UT: Praise the Lord (live). See M 0200.
- 0200 USA, Monitor Radio Intl: Monitor Radio News. See T 0200.
- 0200 USA, WGTG McCaysville GA: Radio Free World. See T 0100.
- 0206 USA, Monitor Radio Intl: Monitor Radio International. See T 0206.
- 0230 Sweden, Radio: Sixty Degrees North. See M 1230.
- 0246 Sweden, Radio: MediaScan (1/3). See T 1246.
- 0249 USA, Monitor Radio Intl: Letterbox. See T 0249.
- 0250 Vatican State, Vatican Radio: The Rome Report. A behind the scenes review of issues currently confronting the church and the world.
- 0252 USA, Monitor Radio Intl: Religious Article from the CSM. See T 0252.

Thursdays

- 0200 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0200 USA, KLTN Salt Lk City UT: Praise the Lord (live). See M 0200.
- 0200 USA, Monitor Radio Intl: Monitor Radio News. See T 0200.
- 0200 USA, WGTG McCaysville GA: Radio Free World. See T 0100.
- 0206 USA, Monitor Radio Intl: Monitor Radio International. See T

- 0206 Sweden, Radio: Sixty Degrees North. See M 1230.
- 0246 Sweden, Radio: Money Matters. See W 1246.
- 0249 USA, Monitor Radio Intl: Letterbox. See T 0249.
- 0250 Vatican State, Vatican Radio: The Pope and the People. See M 0250.
- 0252 USA, Monitor Radio Intl: Religious Article from the CSM. See T 0252.
- 0254 Vatican State, Vatican Radio: Pilgrim City. A look at whose been to Rome recently.

Fridays

- 0200 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0200 USA, KLTN Salt Lk City UT: Praise the Lord (live). See M 0200.
- 0200 USA, Monitor Radio Intl: Monitor Radio News. See T 0200.
- 0200 USA, WGTG McCaysville GA: Radio Free World. See T 0100.
- 0206 USA, Monitor Radio Intl: Monitor Radio International. See T 0206.
- 0230 Sweden, Radio: Sixty Degrees North. See M 1230.
- 0243 Sweden, Radio: GreenScan. See H 1243.
- 0246 Sweden, Radio: Horizon (4/5). See H 1246.
- 0249 USA, Monitor Radio Intl: Letterbox. See T 0249.
- 0250 Vatican State, Vatican Radio: Then and Now. Changes in thinking between Catholics and Protestants.
- 0252 USA, Monitor Radio Intl: Religious Article from the CSM. See T 0252.

Saturdays

- 0200 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0200 USA, KLTN Salt Lk City UT: Praise the Lord (live). See M 0200.
- 0200 USA, Monitor Radio Intl: Monitor Radio News. See T 0200.
- 0200 USA, WGTG McCaysville GA: Radio Free World. See T 0100.
- 0206 USA, Monitor Radio Intl: Christian Science Sentinel Radio Edition. Discussions on how the Bible addresses the trends of thought of today.
- 0230 Sweden, Radio: Sixty Degrees North. See M 1230.
- 0235 Sweden, Radio: A Review of the Newsweek. See F 1235.
- 0250 Vatican State, Vatican Radio: By the Way.... Putting a Catholic perspective on issues in the news.
- 0256 Vatican State, Vatican Radio: Roundtable Discussion. Conversation about today's religious questions.

FREQUENCIES

0300-0400	Anguilla, Caribbean Beacon	6090am				0300-0315 mtwhf	Uganda, Radio	4976do			
0300-0400	Australia, Radio	9660pa	11640as	12080pa	13605pa	0300-0400	Ukraine, R Ukraine Intl	5915na	7150na	9550na	
		13755pa	15240pa	15365pa	15415as	0300-0330	United Kingdom, BBC WS	5970sa	6135af	7235am	15360as
		15510as	17715as	17750pa	17795pa	0300-0400	United Kingdom, BBC WS	3255af	3955eu	5975am	6005af
		17880pa						6175am	6190af	6195eu	9410va
0300-0400 vl	Australia, VL8K Katherine	5025do						9515am	9590am	9600af	9605as
0300-0400 vl	Australia, VL8T Tent Crk	4910do						11730af	11760va	12095af	15310as
0300-0400 vl	Canada, CBC N Quebec Svc	9625do				0300-0400	USA, KAIJ Dallas TX	5810am			
0300-0400	Canada, CFCX Montreal	6005do				0300-0400	USA, KTNB Salt Lk City UT	7510am			
0300-0400	Canada, CFRX Toronto	6070do				0300-0400	USA, KVOH Los Angeles CA	9975am			
0300-0400	Canada, CFVP Calgary	6030do				0300-0400	USA, KWHR Naalehu HI	17510au			
0300-0400	Canada, CHNX Halifax	6130do				0300-0400	USA, Monitor Radio Intl	5850na	7535af		
0300-0400	Canada, CKZN St John's	6160do				0300-0400	USA, Voice of America	6035af	6080af	7105af	7290af
0300-0400	Canada, CKZU Vancouver	6160do						7340af	7415af	9575af	9885af
0300-0400	Canada, R Canada Intl	6010am	6155am	9755am		0300-0330 smtwh	USA, Voice of America	4960af			
0300-0400	China, China Radio Intl	9690am	9710am	11695am		0300-0400	USA, WENW Birmingham AL	5825eu	6890na	7425na	
0300-0400 vl	Costa Rica, Faro del Carib	5055do				0300-0400	USA, WGTG McCaysville GA	5085am			
0300-0400	Costa Rica, RF Peace Intl	6205am	7385am			0300-0400	USA, WHRI Noblesville IN	5760am	7315am		
0300-0310	Croatia, Croatian Radio	5895eu	7165eu			0300-0400	USA, WJCR Upton KY	7490na			
0300-0400	Cuba, Radio Havana	6000na	9820na	9830na		0300-0315 m	USA, WRMI/R Miami Intl	9955am			
0300-0400	Ecuador, HCJB	9745am	21455am			0300-0400	USA, WRNO New Orleans LA	7355am			
0300-0330	Egypt, Radio Cairo	9475na				0300-0400	USA, WWCN Nashville TN	2390am	3215am	5070am	5935am
0300-0350	Germany, Deutsche Welle	6045na	6085na	9535na	9650na	0300-0400	USA, WYFR Okeechobee FL	9985af			
0300-0400	Guatemala, Radio Cultural	3300do				0300-0345	USA, WYFR Okeechobee FL	6065na	9505na		
0300-0400	Japan, R Japan/NHK World	5960na	11790na	11840as	11960as	0300-0310	Vatican State, Vatican R	6095na	7305na		
		15230na	17810as			0300-0400 vl	Zambia, R Zambia/ZNBC 1	4910do			
0300-0400 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do		0300-0400 vl	Zambia, R Zambia/ZNBC 2	6165do			
0300-0400	Lebanon, Voice of Hope	9960va				0300-0400 vl	Zimbabwe, Zimbabwe BC	3396do			
0300-0400 vl	Malaysia, RTM Kuching	7160do				0310-0340	Vatican State, Vatican R	7360af			
0300-0400 s/vl	Malta, VO Mediterranean	1550as	17570au			0315-0330 s	Greece, Voice of	6260na	7450na	9425na	
0300-0330	Mexico, Radio Mexico Intl	9705na				0330-0355 mtwhf	Moldova, R Moldova Intl	7520eu			
0300-0325	Netherlands, Radio	9860as	11655as			0330-0400 vl	Philippines, R Pilipinas	13770as	15330na	17730as	
0300-0400	New Zealand, R NZ Intl	15115pa				0330-0355	S Africa, Investment Ch	9775va	11985va		
0300-0400 vl	Papua New Guinea, NBC	9675do				0330-0400	Slovakia, Adv World Radio	9465af			
0300-0400	Russia, Voice of Russia WS	5930na	6150na	7175na	7345na	0330-0400	Sweden, Radio	7115na			
		9580na				0330-0400	Tanzania, Radio	5050af			
0300-0400 mtwhf	Russia, Voice of Russia WS	5920na				0330-0400	UAE, Radio Dubai	13665na	15400eu	21485na	
0300-0355	S Africa, Channel Africa	3220af	5955af			0330-0400	United Kingdom, BBC WS	9610af	11955as	15280as	
0300-0325	S Africa, Investment Ch	7175va	9775va			0335-0355 vl	India, All India Radio	7110do	11830do	15135do	
0300-0400	Sri Lanka, Sri Lanka BC	9730as				0340-0350	Greece, Voice of	6260na	7450na	9425na	
0300-0400	Taiwan, VO Free China	5950na	9680na	11745as	11825as	0345-0400 irreg	Burundi, Radio Nationale	6140do			
		15345as				0345-0400	Tajikistan, R Dushanbe	9905as			
0300-0330	Thailand, Radio	9655na	11890na	11905na		0345-0400 as	Uganda, Radio	4976do			
0300-0400	Turkey, Voice of	7300eu	9685na	17705eu		0356-0400	Zambia, Christian Voice	3330af	6065af		

SELECTED PROGRAMS

Sundays

- 0300 Japan, NHK/Radio: News. World news from NHK International.
- 0300 USA, KTNB Salt Lk City UT: Gospel America. Pat Boone and his guests perform.
- 0300 USA, WGTG McCaysville GA: North of 49. Kevin Scott hosts this new program about the radio listening hobby.
- 0310 Japan, NHK/Radio: Hello from Tokyo. The weekend magazine program.
- 0320 Vatican State, Vatican Radio: News. See S 0152.
- 0330 Sweden, Radio: Spectrum (T). See S 0030.
- 0330 USA, KTNB Salt Lk City UT: Power Connection. John Jacobs and the power team perform feats of strength.
- 0333 Vatican State, Vatican Radio: News from the Church. News of the Catholic Church in the Vatican and around the world.
- 0343 Vatican State, Vatican Radio: Panorama. A daily summary of news from the news agencies.
- 0355 Japan, NHK/Radio: News Summary. A five-minute news wrap-up.

Mondays

- 0300 USA, KTNB Salt Lk City UT: Praise the Lord. See M 0200.
- 0300 USA, WGTG McCaysville GA: Biblical Studies Institute. Bob Tref evangelizes from Rapid City, South Dakota.
- 0315 Japan, NHK/Radio: Radio Japan Magazine Hour. The weekday magazine program of feature reports and the popular vocal music of Japan.
- 0316 Japan, NHK/Radio: News Commentary. An editorial opinion on the current news.
- 0320 Vatican State, Vatican Radio: News from the African Church. Activities of the Catholic Church in Africa.
- 0325 Japan, NHK/Radio: Japan Diary. Life in Japan as seen through the eyes of a foreign resident in Japan.
- 0330 Japan, NHK/Radio: Close Up. Featuring a Japanese person of note.
- 0330 Sweden, Radio: In Touch with Stockholm (biweekly). See S 1230.
- 0330 Sweden, Radio: Sounds Nordic (biweekly). See S 1230.
- 0330 Vatican State, Vatican Radio: Panorama. See S 0343.
- 0345 Japan, NHK/Radio: Sports Spotlight. Focus on a current sporting event in the region.

- 0355 Japan, NHK/Radio: News Summary. See S 0355.

Tuesdays

- 0300 KTNB Salt Lk City: Praise the Lord (live). See M 0200.
- 0300 USA, WGTG McCaysville GA: A Call to Decision. Butch Paugh claims to have the answers to America's problems.
- 0304 Vatican State, Vatican Radio: Ask the Abbot. See M 2300.
- 0315 Japan, NHK/Radio: Radio Japan Magazine Hour. See M 0315.
- 0316 Japan, NHK/Radio: News Commentary. See M 0316.
- 0320 Vatican State, Vatican Radio: News. See S 0152.
- 0325 Japan, NHK/Radio: Japan Diary. See M 0325.
- 0330 Japan, NHK/Radio: Close Up. See M 0330.
- 0330 Sweden, Radio: Sixty Degrees North. See M 1230.
- 0338 Vatican State, Vatican Radio: Panorama. See S 0343.
- 0340 Japan, NHK/Radio: Japanese Culture Today. Comparing modern-day Japan with the customs of old.
- 0348 Sweden, Radio: SportScan. See M 1246.
- 0355 Japan, NHK/Radio: News Summary. See S 0355.

Wednesdays

- 0300 KTNB Salt Lk City: Praise the Lord (live). See M 0200.
- 0300 USA, WGTG McCaysville GA: A Call to Decision. See T 0300.
- 0306 Vatican State, Vatican Radio: What Can I Do? See T 2300.
- 0315 Japan, NHK/Radio: Radio Japan Magazine Hour. See M 0315.
- 0316 Japan, NHK/Radio: News Commentary. See M 0316.
- 0320 Vatican State, Vatican Radio: News. See S 0152.
- 0323 Japan, NHK/Radio: Japan Diary. See M 0325.
- 0330 Japan, NHK/Radio: Close Up. See M 0330.
- 0330 Sweden, Radio: Sixty Degrees North. See M 1230.
- 0338 Vatican State, Vatican Radio: Panorama. See S 0343.
- 0340 Japan, NHK/Radio: Asian Report. Current events in the Asia-Pacific region.
- 0346 Sweden, Radio: MediaScan (1/3). See T 1246.
- 0355 Japan, NHK/Radio: News Summary. See S 0355.

Thursdays

- 0300 KTNB Salt Lk City: Praise the Lord (live). See M 0200.
- 0300 USA, WGTG McCaysville GA: A Call to Decision. See T 0300.
- 0304 Vatican State, Vatican Radio: Postcards from Rome. An

- audio vignette of life in the eternal city.
- 0315 Japan, NHK/Radio: Radio Japan Magazine Hour. See M 0315.
- 0316 Japan, NHK/Radio: News Commentary. See M 0316.
- 0320 Vatican State, Vatican Radio: News. See S 0152.
- 0323 Japan, NHK/Radio: Japan Diary. See M 0325.
- 0330 Japan, NHK/Radio: Close Up. See M 0330.
- 0330 Sweden, Radio: Sixty Degrees North. See M 1230.
- 0338 Vatican State, Vatican Radio: Panorama. See S 0343.
- 0340 Japan, NHK/Radio: Crosscurrents. Radio Japan's mailbag program.
- 0346 Sweden, Radio: Money Matters. See W 1246.
- 0355 Japan, NHK/Radio: News Summary. See S 0355.

Fridays

- 0300 KTNB Salt Lk City: Praise the Lord (live). See M 0200.
- 0300 USA, WGTG McCaysville GA: A Call to Decision. See T 0300.
- 0315 Japan, NHK/Radio: Radio Japan Magazine Hour. See M 0315.
- 0316 Japan, NHK/Radio: News Commentary. See M 0316.
- 0320 Vatican State, Vatican Radio: News. See S 0152.
- 0323 Japan, NHK/Radio: Japan Diary. See M 0325.
- 0330 Japan, NHK/Radio: Close Up. See M 0330.
- 0330 Sweden, Radio: Sixty Degrees North. See M 1230.
- 0338 Vatican State, Vatican Radio: Panorama. See S 0343.
- 0340 Japan, NHK/Radio: Business Focus. A segment of the Magazine Hour which spotlights an aspect of business in Japan.
- 0345 Sweden, Radio: GreenScan. See H 1243.
- 0346 Sweden, Radio: Horizon (4/5). See H 1246.
- 0355 Japan, NHK/Radio: News Summary. See S 0355.

Saturdays

- 0300 KTNB Salt Lk City: Praise the Lord (live). See M 0200.
- 0300 USA, WGTG McCaysville GA: A Call to Decision. See T 0300.
- 0310 Japan, NHK/Radio: This Week. A weekly variety show.
- 0320 Vatican State, Vatican Radio: News. See S 0152.
- 0330 Sweden, Radio: Sixty Degrees North. See M 1230.
- 0330 Vatican State, Vatican Radio: News of the Church. See S 0333.
- 0335 Sweden, Radio: A Review of the Newsweek. See F 1235.
- 0338 Vatican State, Vatican Radio: Panorama. See S 0343.
- 0355 Japan, NHK/Radio: News Summary. See S 0355.

FREQUENCIES

0400-0500	Anguilla, Caribbean Beacon	6090am				0400-0430	Tanzania, Radio	5050af			
0400-0500	Australia, Radio	9660pa	11880pa	12080pa	13605as	0400-0415	Uganda, Radio	4976do			
		15240pa	15365pa	15415as	15510as	0400-0500	United Kingdom, BBC WS	3255af	3955eu	5975af	6005af
		17750as	17795pa	17880pa				6175am	6180eu	6190af	6195eu
0400-0500 as	Australia, Radio	11640as						7160af	9410af	9590am	9600af
0400-0500 vl	Australia, VL8K Katherine	5025do						9610af	11760va	11955as	12085af
0400-0500 vl	Australia, VL8T Tent Crk	4910do						15280as	15310as	15575va	
0400-0500	Bulgaria, Radio	7375na	9485na			0400-0430	United Kingdom, BBC WS	9605as	11730af		
0400-0500 vl	Canada, CBC N Quebec Svc	9625do				0400-0500	USA, KAIJ Dallas TX	5810am			
0400-0500	Canada, CFCX Montreal	6005do				0400-0500	USA, KTBN Salt Lk City UT	7510am			
0400-0500	Canada, CFRX Toronto	6070do				0400-0500	USA, KVOH Los Angeles CA	9975am			
0400-0500	Canada, CFVP Calgary	6030do				0400-0500	USA, KWHR Naalehu HI	17780as			
0400-0500	Canada, CHNX Halifax	6130do				0400-0500	USA, Monitor Radio Intl	7535eu	9840af		
0400-0500	Canada, CKZN St John's	6160do				0400-0500	USA, Voice of America	4960af	6035af	6080af	7145af
0400-0500	Canada, CKZU Vancouver	6160do						7340af	7415af	9575af	9775af
0400-0430	Canada, R Canada Intl	6150me	9505me	9645me		0400-0500	USA, WEWN Birmingham AL	5825eu	6890na	7425na	
0400-0500	China, China Radio Intl	9560am	9730am			0400-0500	USA, WGTG McCaysville GA	5085am			
0400-0500	Costa Rica, RF Peace Intl	6205am	7385am			0400-0500	USA, WHRI Noblesville IN	5760am	7315am		
0400-0500	Cuba, Radio Havana	6000na	6180na	9820na	9830na	0400-0500	USA, WJCR Upton KY	7490na			
0400-0500	Ecuador, HCJB	9745am	21455am			0400-0500 smtwhf	USA, WMLK Bethel PA	9465eu			
0400-0450	Germany, Deutsche Welle	6015af	6065af	7225af	7265af	0400-0500	USA, WRNO New Orleans LA	7355am			
		9565af				0400-0500	USA, WWCR Nashville TN	2390am	3215am	5070am	5935am
0400-0500 twhfa	Guatemala, Radio Cultural	3300do				0400-0500	USA, WYFR Okeechobee FL	5985na	9985eu	11695af	
0400-0415	Israel, Kol Israel	7465na	9435na	17545af		0400-0428	Vatican State, Vatican R	5882eu			
0400-0500 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do		0400-0430	Vietnam, Voice of	12020na	15010na		
0400-0500	Lebanon, Voice of Hope	9960va				0400-0500	Zambia, Christian Voice	3330af	6065af		
0400-0430 s/vl	Malta, VO Mediterranean	15550as	17570au			0400-0500 vl	Zambia, R Zambia/ZNBC 1	4910do			
0400-0430 m-a/vl	Mexico, Radio Mexico Intl	9705na				0400-0500 vl	Zambia, R Zambia/ZNBC 2	6165do			
0400-0458	New Zealand, R NZ Intl	15115pa				0400-0500 vl	Zimbabwe, Zimbabwe BC	3396do			
0400-0450	North Korea, R Pyongyang	15180as	15230as	17765as		0425-0440	Italy, RAI Intl	5975eu	7275eu		
0400-0430 m	Norway, Radio Norway Intl	9565eu	7305me	7440na		0425-0500	Nigeria, FRCN/Radio	3326do	4770do	4990do	
0400-0500 vl	Papua New Guinea, NBC	9675do				0430-0500	Australia, Defense Forces R	13525as			
0400-0430	Romania, R Romania Intl	5990na	6155na	9510na	9570na	0430-0500	Netherlands, Radio	5995na	6165na		
		11940na				0430-0500 mtwhf	Portugal, R Portugal Intl	6150am	9570am		
0400-0500	Russia, Voice of Russia WS	5930na	6150na	7175na		0430-0500	Russia, Voice of Russia WS	5905na			
0400-0500 mtwhfa	Russia, Voice of Russia WS	5920na				0430-0455	S Africa, Investment Ch	11985va	15225va		
0400-0455	S Africa, Channel Africa	5955af	9585af			0430-0500	Slovakia, Adv World Radio	11600eu			
0400-0425	S Africa, Investment Ch	11985va	15225va			0430-0500	Swaziland, Trans World R	3200af	4775af	6070af	6100af
0400-0430	Slovakia, Adv World Radio	11600af				0430-0500	Switzerland, Swiss R Intl	9905na			
0400-0500	Slovakia, Adv World Radio	7215eu				0430-0500	United Kingdom, BBC WS	15420af			
0400-0430	Sri Lanka, Sri Lanka BC	9730as				0430-0500	USA, Voice of America	7170va			
0400-0430	Switzerland, Swiss R Intl	6135na	9885na	9905na		0455-0500	Malaysia, Voice of	6175as	9750as	15295au	
						0459-0500	New Zealand, R NZ Intl	9795pa			

SELECTED PROGRAMS

Sundays

- 0400 Bulgaria, Radio: News. Fifteen minutes of world and Bulgarian news.
- 0400 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0400 USA, KTBN Salt Lk City UT: Real Videos. Music videos with a Christian theme.
- 0410 Bulgaria, Radio: Topics of the Week. Headlines to the main points in the news.
- 0415 Bulgaria, Radio: The News Behind the News. Background to a specific item of current affairs.
- 0430 Bulgaria, Radio: History Club. True stories about the Ottoman Empire period.
- 0430 USA, KTBN Salt Lk City UT: By the Way, Del & Cindy Way host this music program from Dallas.

Mondays

- 0400 Bulgaria, Radio: News. See S 0400.
- 0400 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0400 USA, KTBN Salt Lk City UT: Praise the Lord. See M 0200.
- 0400 USA, Monitor Radio Intl: Sunday from the Mother Church. See M 0200.
- 0400 WGTG McCaysville: The Gethsemane Hour. See M 0100.
- 0415 Bulgaria, Radio: Timeout for Music. See S 2315.
- 0430 Bulgaria, Radio: Straight from the Horse's Mouth. Discussion of a current matter affecting Bulgaria in an interview with a cognizant official.
- 0430 WGTG McCaysville: Voice in the Wilderness. See M 0030.
- 0445 Bulgaria, Radio: Radio Bulgaria Calling. A weekly DX program for radio amateurs and shortwave listeners.

Tuesdays

- 0400 Bulgaria, Radio: News. See S 0400.
- 0400 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0400 USA, KTBN Salt Lk City UT: The Voice of Power. RW Schambach preaches from Tyler, Texas.
- 0400 USA, Monitor Radio Intl: Monitor Radio News. See T 0200.
- 0406 USA, Monitor Radio Intl: Monitor Radio International. See T 0206.

- 0415 Bulgaria, Radio: Events and Development. See M 2317.
- 0415 Bulgaria, Radio: Radio Bulgaria Spectrum. See S 2330.
- 0430 USA, KTBN Salt Lk City UT: Doctor to Doctor. Helen Pensanti hosts this program about health.
- 0449 USA, Monitor Radio Intl: Letterbox. See T 0249.
- 0452 USA, Monitor Radio Intl: Religious Article from the CSM. See T 0252.

Wednesdays

- 0400 Bulgaria, Radio: News. See S 0400.
- 0400 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0400 KTBN Salt Lk City: Praise the Lord (live). See M 0200.
- 0400 USA, Monitor Radio Intl: Monitor Radio News. See T 0200.
- 0406 USA, Monitor Radio Intl: Monitor Radio International. See T 0206.
- 0430 Bulgaria, Radio: Across the Map of Bulgaria. See T 1115.
- 0430 WGTG McCaysville: Biblical Studies Institute. See M 0300.
- 0449 USA, Monitor Radio Intl: Letterbox. See T 0249.
- 0452 USA, Monitor Radio Intl: Religious Article from the CSM. See T 0252.

Thursdays

- 0400 Bulgaria, Radio: News. See S 0400.
- 0400 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0400 Radio Mexico Intl: Tour Through Mexico. Explore the world of fantastic cultures.
- 0400 USA, KTBN Salt Lk City UT: Adventures in Faith. See M 0630.
- 0400 USA, Monitor Radio Intl: Monitor Radio News. See T 0200.
- 0406 USA, Monitor Radio Intl: Monitor Radio International. See T 0206.
- 0430 Bulgaria, Radio: Answering Your Letters. See T 2330.
- 0430 USA, KTBN Salt Lk City UT: Jesse Duplantier. See M 0600.
- 0449 USA, Monitor Radio Intl: Letterbox. See T 0249.
- 0450 Bulgaria, Radio: Sports Roundup. See T 2349.
- 0452 USA, Monitor Radio Intl: Religious Article from the CSM. See T 0252.

Fridays

- 0400 Bulgaria, Radio: News. See S 0400.

- 0400 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0400 USA, KTBN Salt Lk City UT: Praise the Lord (live). See M 0200.
- 0400 USA, Monitor Radio Intl: Monitor Radio News. See T 0200.
- 0406 USA, Monitor Radio Intl: Monitor Radio International. See T 0206.
- 0449 USA, Monitor Radio Intl: Letterbox. See T 0249.
- 0452 USA, Monitor Radio Intl: Religious Article from the CSM. See T 0252.

Saturdays

- 0400 Bulgaria, Radio: News. See S 0400.
- 0400 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0400 Radio Mexico Intl: The World of Mexican Art. See S 1500.
- 0400 USA, KTBN Salt Lk City UT: Dino. Christian music from Branson, Missouri.
- 0400 USA, Monitor Radio Intl: Monitor Radio News. See T 0200.
- 0430 Bulgaria, Radio: Lifestyle. See H 2330.
- 0430 USA, KTBN Salt Lk City UT: Charisma Now. See T 2300.
- 0430 USA, WGTG McCaysville GA: Biblical Studies Institute. See M 0300.

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FREQUENCIES

0500-0600	Anguilla, Caribbean Beacon	6090am				0500-0515	Uganda, Radio	4976do			
0500-0600	Australia, Radio	9660pa	11880pa	12080pa	13605as	0500-0600	United Kingdom, BBC WS	3255af	3955va	5975am	6005af
		15240pa	15365pa	17715pa	17795pa			6175am	6180va	6190af	6195eu
		17880pa						7150va	7160af	9410va	9600af
0500-0600 as	Australia, Radio	11640as						9740as	11760va	11955as	12095va
0500-0600 vl	Australia, VL8K Katherine	5025do						15310as	15360as	15420af	15575va
0500-0600 vl	Australia, VL8T Tent Crk	4910do						17640af	17885af		
0500-0600	Australia, Defense Forces R	13525as				0500-0600	USA, KAIJ Dallas TX	5810am			
0500-0600	Canada, CFCX Montreal	6005do				0500-0600	USA, KTBN Salt Lk City UT	7510am			
0500-0600	Canada, CFRX Toronto	6070do				0500-0600	USA, KVOH Los Angeles CA	9975am			
0500-0600	Canada, CFVP Calgary	6030do				0500-0600	USA, KWHR Naalehu HI	9930as			
0500-0600	Canada, CHNX Halifax	6130do				0500-0600	USA, Monitor Radio Intl	7535eu			
0500-0600	Canada, CKZU Vancouver	6160do				0500-0600	USA, Voice of America	4960af	5970af	6035af	6080af
0500-0600	China, China Radio Intl	9560am						7170va	7295af	9700va	9775af
0500-0600	Costa Rica, Adv World R	5030ca	6150ca	9725ca				11825me	12080af	12085eu	15205me
0500-0600	Costa Rica, RF Peace Intl	6205am	7385am			0500-0600	USA, WGTG McCaysville GA	5085am			
0500-0600	Cuba, Radio Havana	6000na	9820na	9830na		0500-0600	USA, WHRI Noblesville IN	5760am	7315am		
0500-0600	Ecuador, HCJB	9745am	2145am			0500-0600	USA, WJCR Upton KY	7490na			
0500-0550	Germany, Deutsche Welle	6120na	6145na	6185na	9650na	0500-0600 smtw/hf	USA, WMLK Bethel PA	9465eu			
0500-0600 vl	Italy, IRRS	3985va				0500-0600	USA, WRNO New Orleans LA	7355am			
0500-0600	Japan, R Japan/NHK World	6110na	6150eu	9835na	11740as	0500-0600	USA, WWCR Nashville TN	2390am	3210am	5070am	5935am
		11910am	11920na	17810as		0500-0600	USA, WYFR Okeechobee FL	5985af	7355eu	9985af	
0500-0530	Japan, R Japan/NHK World	9635am	11895am	12000am		0500-0528	Vatican State, Vatican R	9660af	11625af		
0500-0600 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do		0500-0520	Vatican State, Vatican R	5882eu	7250eu		
0500-0600	Lebanon, Voice of Hope	9960va				0500-0600	Zambia, Christian Voice	3330af	6065af		
0500-0600	Liberia, LCN/R Liberia Int	5100do				0500-0530 vl	Zambia, R Zambia/ZNBC 1	4910do			
0500-0510 mtw/hf	Malawi, Malawi Broadc Corp	3380do				0500-0600 vl	Zambia, R Zambia/ZNBC 2	6165do			
0500-0600	Malaysia, Voice of	6175as	9750as	15295au		0500-0530 vl	Zimbabwe, Zimbabwe BC	3396do			
0500-0525	Netherlands, Radio	5995na	6165na			0515-0530	Switzerland, Swiss R Intl	5840eu	6165eu		
0500-0600	New Zealand, R NZ Intl	9795pa				0525-0600	Ghana, Ghana Broadc Corp	3366do	4915do		
0500-0505	Nigeria, FRCN/Radio	3326do	4770do	4990do		0530-0559	Austria, R Austria Intl	6015na	6155eu	13730eu	15410me
0500-0600 vl	Papua New Guinea, NBC	9675do						17870me			
0500-0600	Russia, Voice of Russia WS	5905na	5920na	5930na	6150na	0530-0600	Guyana, Voice of	3290do			
		7175na	7330na	12025pa	12035as	0530-0600	Romania, R Romania Intl	11940af	15250af	15365af	17745af
		15460as	15470au	17570pa	21790au			17790af			
0500-0555	S Africa, Channel Africa	5955af				0530-0555	S Africa, Investment Ch	11985va			
0500-0525	S Africa, Investment Ch	11985va	15225va			0530-0600	Thailand, Radio	9655eu	11905eu	15115eu	
0500-0600	Spain, R Exterior Espana	6055am				0530-0600 vl	Zambia, R Zambia/ZNBC 1	7220do			
0500-0600	Swaziland, Trans World R	3200af	4775af	6070af	6100af	0530-0600 vl	Zimbabwe, Zimbabwe BC	5975do			
		9500af									

SELECTED PROGRAMS
Sundays

- 0500 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0500 Spain, R Exterior de Espana: News. See S 0000.
- 0500 USA, KTBN Salt Lk City UT: Behind the Scenes. TBN news, letters, and reports with Paul Krause.
- 0500 Vatican State, Vatican Radio: The Gospel. Readings from the holy book.
- 0500 Vatican State, Vatican Radio: With Heart and Mind. See S 0250.
- 0508 Vatican State, Vatican Radio: On-the-Air. See S 0258.
- 0511 Spain, R Exterior de Espana: Cultural Encounters. See S 0011.
- 0527 Spain, R Exterior de Espana: Distance Unknown. See S 0027.
- 0530 USA, KTBN Salt Lk City UT: Highway to Heaven. Jeff Van Horn offers advice to juveniles.
- 0536 Spain, R Exterior de Espana: Spanish Poparama. See S 0036.

Mondays

- 0500 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0500 Spain, R Exterior de Espana: News. See S 0000.
- 0500 USA, WGTG McCaysville GA: Biblical Studies Institute. See M 0300.
- 0500 Vatican State, Vatican Radio: News from the African Church. See M 0320.
- 0500 Vatican State, Vatican Radio: To the Ends of the Earth. A 25-episode series of bible-based radio dramas.
- 0510 Spain, R Exterior de Espana: Visitors Book. See M 0011.
- 0522 Spain, R Exterior de Espana: Spanish Echoes. See M 0022.
- 0523 Vatican State, Vatican Radio: Sports Corner. African sports results.
- 0530 USA, KTBN Salt Lk City UT: Changing Your World. Grefilo A. Dollar, Jr. evangelizes.
- 0538 Spain, R Exterior de Espana: Radio Club. See M 0038.

Tuesdays

- 0500 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0500 Spain, R Exterior de Espana: The News from Spain. See T 0000.
- 0500 USA, KTBN Salt Lk City UT: Jack Van Impe Presents. Reporting and interpreting international news in bible prophecy.

- 0500 Vatican State, Vatican Radio: A Room with a View of the Vatican. See T 0250.
- 0500 Vatican State, Vatican Radio: News of the Church. See S 0333.
- 0515 Vatican State, Vatican Radio: Ask the Abbot. See M 2300.
- 0517 Vatican State, Vatican Radio: News from the African Church. See M 0320.
- 0521 Vatican State, Vatican Radio: Panorama. See S 0343.
- 0530 USA, KTBN Salt Lk City UT: This is Your Day!. See T 0100.
- 0532 Spain, R Exterior de Espana: Spanish Music. See T 0032.
- 0536 Spain, R Exterior de Espana: Press Review. See T 0036.
- 0541 Spain, R Exterior de Espana: Entertainment in Spain. See T 0041.
- 0551 Spain, R Exterior de Espana: Spanish Course by Radio. See T 0051.

Wednesdays

- 0500 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0500 Spain, R Exterior de Espana: The News from Spain. See T 0000.
- 0500 USA, KTBN Salt Lk City UT: Reinhard Bonnke Preaches. See S 1400.
- 0500 Vatican State, Vatican Radio: The Environment. A weekly UN report on environmental development programs in Africa.
- 0500 Vatican State, Vatican Radio: The Rome Report. See W 0250.
- 0510 Vatican State, Vatican Radio: News from the African Church. See M 0320.
- 0516 Vatican State, Vatican Radio: What Can I Do?. See T 2300.
- 0530 Spain, R Exterior de Espana: Spanish Music. See T 0032.
- 0530 USA, KTBN Salt Lk City UT: This is Your Day!. See T 0100.
- 0534 Spain, R Exterior de Espana: Press Review. See T 0036.
- 0539 Spain, R Exterior de Espana: Kaleidoscope. See W 0039.
- 0547 Spain, R Exterior de Espana: Spanish Course by Radio. See T 0051.

Thursdays

- 0500 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0500 Spain, R Exterior de Espana: The News from Spain. See T 0000.
- 0500 USA, KTBN Salt Lk City UT: Myles Munroe, Myles Munroe
- 0500 Vatican State, Vatican Radio: The Pope and the People. See M 0250.

- 0505 Vatican State, Vatican Radio: Pilgrim City. See H 0254.
- 0512 Vatican State, Vatican Radio: News of the Church. See S 0333.
- 0514 Vatican State, Vatican Radio: Postcards from Rome. See H 0304.
- 0530 Spain, R Exterior de Espana: Spanish Music. See T 0032.
- 0530 USA, KTBN Salt Lk City UT: This is Your Day!. See T 0100.
- 0533 Spain, R Exterior de Espana: Press Review. See T 0036.
- 0539 Spain, R Exterior de Espana: Window on Spain. See H 0040.
- 0549 Spain, R Exterior de Espana: Spanish Course by Radio. See T 0051.

Fridays

- 0500 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0500 Spain, R Exterior de Espana: The News from Spain. See T 0000.
- 0500 USA, KTBN Salt Lk City UT: Precious Memories. See H 0100.
- 0500 Vatican State, Vatican Radio: Then and Now. See F 0250.
- 0512 Vatican State, Vatican Radio: News of the Church. See S 0333.
- 0530 Spain, R Exterior de Espana: Press Review. See T 0036.
- 0530 USA, KTBN Salt Lk City UT: This is Your Day!. See T 0100.
- 0536 Spain, R Exterior de Espana: Radio Club. See M 0038.
- 0548 Spain, R Exterior de Espana: Spanish Course by Radio. See T 0051.

Saturdays

- 0500 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0500 Spain, R Exterior de Espana: The News from Spain. See T 0000.
- 0500 USA, KTBN Salt Lk City UT: Carman. See S 0200.
- 0500 Vatican State, Vatican Radio: By the Way.... See A 0250.
- 0500 Vatican State, Vatican Radio: News. See S 0152.
- 0506 Vatican State, Vatican Radio: Roundtable Discussion. See A 0256.
- 0512 Vatican State, Vatican Radio: Orders of the Day. Religious life as revealed by those who choose to live it.
- 0530 Spain, R Exterior de Espana: Spanish Music. See T 0032.
- 0530 USA, KTBN Salt Lk City UT: This is Your Day!. See T 0100.
- 0533 Spain, R Exterior de Espana: Press Review. See T 0036.
- 0538 Spain, R Exterior de Espana: Review of the Arts. See A 0038.
- 0548 Spain, R Exterior de Espana: Spanish Course by Radio. See T 0051.

FREQUENCIES

0600-0700	Anguilla, Caribbean Beacon	6090am			0600-0700	Swaziland, Trans World R	3200af	4775af	6070af	6100af
0600-0700	Australia, Radio	9660pa	9860pa	11880pa	12080pa		9500af	9650af		
		13605as	15240pa	15365pa	15415as	0600-0630	Switzerland, Swiss R Intl	9885af	11860af	13635af
		15530as	17715as	17880pa		0600-0700	United Kingdom, BBC WS	3955eu	5975am	6005af
0600-0700 vl	Australia, VL8K Katherine	5025do					6180va	6190af	6195eu	7145as
0600-0700 vl	Australia, VL8T Tent Crk	4910do					7160af	7325va	9410eu	9600af
0600-0633	Australia, Defense Forces R	13525as					9740as	11940af	11955as	15310as
0600-0700 vl	Canada, CBC N Quebec Svc	9625do					15360as	15420af	17640af	17790as
0600-0700	Canada, CFCX Montreal	6005do					17885af	21660as		
0600-0700	Canada, CFRX Toronto	6070do				0600-0700	USA, KAIJ Dallas TX	5810am		
0600-0700	Canada, CFVP Calgary	6030do				0600-0700	USA, KTBN Salt Lk City UT	7510am		
0600-0700	Canada, CHNX Halifax	6130do				0600-0700	USA, KVOH Los Angeles CA	9975am		
0600-0700	Canada, CKZU Vancouver	6160do				0600-0700	USA, KWHR Naalehu HI	9930as		
0600-0630 mtwhf	Canada, R Canada Intl	6050eu	6150eu	9740af	9760af	0600-0700	USA, Monitor Radio Intl	7535eu		
		11905me				0600-0700	USA, Voice of America	5970eu	5995va	6035eu
0600-0700	Costa Rica, RF Peace Intl	6205am	7385am				7170va	7285af	9760me	11805va
0600-0700	Cuba, Radio Havana	6000na	9830na				11825me	11950eu	15205me	15600eu
0600-0700	Ecuador, HCJB	9745am	21455am			0600-0630	USA, Voice of America	4960af		
0600-0650	Germany, Deutsche Welle	7225af	9565af	11765af	13790af	0600-0700	USA, WEWN Birmingham AL	5825eu	6890na	7425na
		17820as	21705me			0600-0700	USA, WHRI Noblesville IN	5760am	7315am	
0600-0615	Ghana, Ghana Broadc Corp	3366do	4915do			0600-0700	USA, WJCR Upton KY	7490na		
0600-0700 vl	Italy, IRRS	3985va				0600-0700 smtwhf	USA, WMLK Bethel PA	9465eu		
0600-0700	Japan, R Japan/NHK World	11850as	11910as	17810au		0600-0700	USA, WWCR Nashville TN	2390am	3210am	5070am
0600-0700 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do		0600-0645	USA, WYFR Okeechobee FL	7355eu	9985eu	5935am
0600-0700 vl	Kiribati, Radio	9825do				0600-0700	USA, WYFR Okeechobee FL	9455af		
0600-0700	Lebanon, Voice of Hope	9960va				0600-0645 vl/m-f	Vatican State, Vatican R	4005eu	5880eu	7250eu
0600-0700	Liberia, LCN/R Liberia Int	5100do				0600-0645 vl/m-f	Vatican State, Vatican R	15215me		
0600-0700	Malaysia, Voice of	6175as	9750as	15295au		0600-0630	Vietnam, Voice of	5925as	10060as	
0600-0700	New Zealand, R NZ Intl	9795pa				0600-0700	Yemen, Yemeni Rep Radio	9780do		
0600-0630	Nigeria, FRCN/Radio	3326do	4770do	4990do		0600-0700	Zambia, Christian Voice	3330af	6065af	
0600-0650	North Korea, R Pyongyang	15180as	15230as			0600-0700 vl	Zambia, R Zambia/ZNBC 1	7220do		
0600-0630 s	Norway, Radio Norway Intl	5965eu	7180af	9590me	15235af	0600-0700 vl	Zimbabwe, Zimbabwe BC	5975do		
0600-0700 vl	Papua New Guinea, NBC	9675do				0603-0610	Croatia, Croatian Radio	5895eu	7165eu	9830eu
0600-0700	Russia, Voice of Russia WS	5905as	5930na	6150na	7175na	0615-0630	Switzerland, Swiss R Intl	5840eu	6165eu	
		7330na	12025au	12035as	15460as	0630-0655	Austria, R Austria Intl	6015na		
0600-0700 mtwhf	Russia, Voice of Russia WS	15470pa	17570pa	21790au		0630-0700	Belgium, R Vlaanderen Int	5985eu	9925eu	9940au
0600-0625	S Africa, Investment Ch	9675af	11985af	15225af		0630-0655	S Africa, Investment Ch	9675af	15225af	17735af
0600-0655	S Africa, Trans World R	11730af				0630-0700	United Kingdom, BBC WS	11780va	15565va	
0600-0610	Sierra Leone, SLBS	3316do				0630-0700	Vatican State, Vatican R	11625af	13765af	15570af
0600-0630	Slovakia, Adv World Radio	13715af				0631-0640	Romania, R Romania Intl	7105eu	9625eu	9665eu
0600-0700	Slovakia, Adv World Radio	5905am				0645-0655 as	Monaco, Trans World Radio	7115eu		11775eu
0600-0630 vl	Solomon Islands, SIBC	5020do	9545do			0645-0700	Romania, R Romania Intl	15370pa	17720pa	17790as
						0655-0700 mtwhf	Monaco, Trans World Radio	7115eu		17805as

SELECTED PROGRAMS

Sundays

- 0600 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0600 Japan, NHK/Radio: News. See S 0300.
- 0600 USA, KTBN Salt Lk City UT: Running to Win. Josh McDowell and Steve Arterburn discuss youth issues.
- 0610 Japan, NHK/Radio: Hello from Tokyo. See S 0310.
- 0630 USA, KTBN Salt Lk City UT: The Meadowlark Lemon Show. An athletic-based ministry.
- 0655 Japan, NHK/Radio: News Summary. See S 0355.

Mondays

- 0600 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0600 Japan, NHK/Radio: News. See S 0300.
- 0600 USA, KTBN Salt Lk City UT: Jesse Duplantier. Evangelizing from New Orleans.
- 0615 Japan, NHK/Radio: Radio Japan Magazine Hour. See M 0315.
- 0616 Japan, NHK/Radio: News Commentary. See M 0316.
- 0625 Japan, NHK/Radio: Japan Diary. See M 0325.
- 0630 Japan, NHK/Radio: Close Up. See M 0330.
- 0630 USA, KTBN Salt Lk City UT: Adventures in Faith. Jerry Savelle.
- 0645 Japan, NHK/Radio: Sports Spotlight. See M 0345.
- 0655 Japan, NHK/Radio: News Summary. See S 0355.

Tuesdays

- 0600 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0600 Japan, NHK/Radio: News. See S 0300.
- 0600 USA, KTBN Salt Lk City UT: This Week in Bible Prophecy. With Peter and Paul LaLonde: Sue Rodgers is the host.
- 0615 Japan, NHK/Radio: Radio Japan Magazine Hour. See M 0315.
- 0616 Japan, NHK/Radio: News Commentary. See M 0316.
- 0625 Japan, NHK/Radio: Japan Diary. See M 0325.
- 0630 Japan, NHK/Radio: Close Up. See M 0330.
- 0630 USA, KTBN Salt Lk City UT: Calling Dr. Whitaker. The doctor talks to a guest about medical matters.
- 0640 Japan, NHK/Radio: Japanese Culture Today. See T 0340.

- 0652 Vatican State, Vatican Radio: Panorama. See S 0343.
- 0655 Japan, NHK/Radio: Tokyo Pop-In. See S 2355.
- 0656 Vatican State, Vatican Radio: News for Young People. Current events for the Catholic youth of Africa.

Wednesdays

- 0600 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0600 Japan, NHK/Radio: News. See S 0300.
- 0615 Japan, NHK/Radio: Radio Japan Magazine Hour. See M 0315.
- 0616 Japan, NHK/Radio: News Commentary. See M 0316.
- 0623 Japan, NHK/Radio: Japan Diary. See M 0325.
- 0630 Japan, NHK/Radio: Close Up. See M 0330.
- 0630 USA, KTBN Salt Lk City UT: Carman. See S 0200.
- 0640 Japan, NHK/Radio: Asian Report. See W 0340.
- 0655 Japan, NHK/Radio: Tokyo Pop-In. See S 2355.

Thursdays

- 0600 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0600 Japan, NHK/Radio: News. See S 0300.
- 0615 Japan, NHK/Radio: Radio Japan Magazine Hour. See M 0315.
- 0616 Japan, NHK/Radio: News Commentary. See M 0316.
- 0623 Japan, NHK/Radio: Japan Diary. See M 0325.
- 0630 Japan, NHK/Radio: Close Up. See M 0330.
- 0630 USA, KTBN Salt Lk City UT: A Call to Action. See S 0000.
- 0630 Vatican State, Vatican Radio: News. See S 0152.
- 0640 Japan, NHK/Radio: Crosscurrents. See H 0340.
- 0655 Japan, NHK/Radio: Tokyo Pop-In. See S 2355.

Fridays

- 0600 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0600 Japan, NHK/Radio: News. See S 0300.
- 0615 Japan, NHK/Radio: Radio Japan Magazine Hour. See M 0315.
- 0616 Japan, NHK/Radio: News Commentary. See M 0316.
- 0623 Japan, NHK/Radio: Japan Diary. See M 0325.
- 0630 Japan, NHK/Radio: Close Up. See M 0330.

- 0630 USA, KTBN Salt Lk City UT: The Doctor and the Word. See M 1130.
- 0640 Japan, NHK/Radio: Business Focus. See F 0340.
- 0652 Vatican State, Vatican Radio: Panorama. See S 0343.
- 0655 Japan, NHK/Radio: Tokyo Pop-In. See S 2355.

Saturdays

- 0600 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 0600 Japan, NHK/Radio: News. See S 0300.
- 0600 USA, KTBN Salt Lk City UT: The Dream Center. A documentary about reaching out to the people of Los Angeles.
- 0610 Japan, NHK/Radio: This Week. See A 0310.
- 0630 USA, KTBN Salt Lk City UT: In the Name of Satan. See F 0030.
- 0630 Vatican State, Vatican Radio: The Gospel. See S 0500.
- 0635 Vatican State, Vatican Radio: Reflection. A prayer by a prominent African.
- 0650 Vatican State, Vatican Radio: News of the Church. See S 0333.
- 0654 Vatican State, Vatican Radio: Panorama. See S 0343.
- 0655 Japan, NHK/Radio: Tokyo Pop-In. See S 2355.

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FREQUENCIES

0900-1000	Anguilla, Caribbean Beacon	6090am				1000-1100	Anguilla, Caribbean Beacon	6090am			
0900-1000	Australia, Radio	5995pa	6020pa	6080pa	9510as	1000-1100	Australia, Radio	5995as	6020pa	6080pa	9510as
		9580pa	9710pa	9860pa	12080pa			9580pa	9860pa	13605as	21725as
		13605as	21725as					2310do			
0900-1000 vl	Australia, VL8A Alice Spg	2310do				1000-1100 vl	Australia, VL8A Alice Spg	2310do			
0900-1000 vl	Australia, VL8K Katherine	2485do				1000-1100 vl	Australia, VL8K Katherine	2485do			
0900-1000 vl	Australia, VL8T Tent Crk	2325do				1000-1100 vl	Australia, VL8T Tent Crk	2325do			
0900-0925 mtwhfa	Belgium, R Vlaanderen Int	6035eu				1000-1100 vl	Canada, CBC N Quebec Svc	9625do			
0900-1000	Canada, CFCX Montreal	6005do				1000-1100	Canada, CFCX Montreal	6005do			
0900-1000	Canada, CFRX Toronto	6070do				1000-1100	Canada, CFRX Toronto	6070do			
0900-1000	Canada, CFVP Calgary	6030do				1000-1100	Canada, CFVP Calgary	6030do			
0900-1000	Canada, CHNX Halifax	6130do				1000-1100	Canada, CHNX Halifax	6130do			
0900-1000	Canada, CKZU Vancouver	6160do				1000-1100	Canada, CKZN St John's	6160do			
0900-1000	China, China Radio Intl	11755pa	15440pa			1000-1100	Canada, CKZU Vancouver	6160do			
0900-1000	Costa Rica, RF Peace Intl	6205am	7385am			1000-1100	China, China Radio Intl	11755pa	15440pa		
0900-0930	Czech Rep, Radio Prague	17485af	21705me			1000-1100	Costa Rica, RF Peace Intl	6205am	7385am		
0900-1000	Ecuador, HCJB	9445pa	21455au			1000-1100	Ecuador, HCJB	9445pa	21455au		
0900-1000 as	Eqt Guinea, R East Africa	15186af				1000-1100 as	Eqt Guinea, R East Africa	15186af			
0900-1000 mtwhf	Eqt Guinea, Radio Africa	15186af				1000-1100 mtwhf	Eqt Guinea, Radio Africa	15186af			
0900-0950	Germany, Deutsche Welle	6160pa	7380as	9565af	11715as	1000-1100	Guam, TWR/KTWR	9870as			
		15145af	15410af	17800af	17820pa	1000-1100	India, All India Radio	11585as	13700as	15050as	17387au
		21600af						17840as			
0900-0915 mtwtf	Ghana, Ghana Broadc Corp	3366do	4915do			1000-1100 vl	Italy, IRRS	7125va			
0900-0915	Guam, TWR/KTWR	15200as				1000-1100	Jordan, Radio	11690eu			
0900-1000	Guyana, Voice of	3290do				1000-1100	Lebanon, Voice of Hope	9960va			
0900-1000 vl	Italy, IRRS	7125va				1000-1100	Malaysia, Radio	7295do			
0900-1000	Japan, R Japan/NHK World	7125as	11815as	11850au		1000-1100 vl	Malaysia, RTM Kuching	7160do			
0900-0930 vl	Kiribati, Radio	9825do				1000-1100 vl	Malaysia, RTM Kota Kinabalu	5980do			
0900-1000	Lebanon, Voice of Hope	9960va				1000-1025	Netherlands, Radio	5965pa	7260as	9810as	9830au
0900-0915	Liberia, LCN/R Liberia Int	5100do				1000-1100	New Zealand, R NZ Intl	9700pa			
0900-1000	Malaysia, Radio	7295do				1000-1100 as	Palau, KHBN/Voice of Hope	9730as			
0900-0925	Netherlands, Radio	5965pa	9830au	13700pa		1000-1100 vl	Papua New Guinea, NBC	4890do			
0900-1000	New Zealand, R NZ Intl	9700pa				1000-1100	Philippines, FEBC/R Intl	11635as			
0900-0930 s	Norway, Radio Norway Intl	13800au	15220me			1000-1100	Russia, Voice of Russia WS	9705as	11655as	13785as	15120as
0900-1000 as	Palau, KHBN/Voice of Hope	9730as						15460as	15490as	15560as	17755as
0900-1000 vl	Papua New Guinea, NBC	4890do						17860as			
0900-1000	Russia, Voice of Russia WS	7150va	7220as	9675pa	9835pa	1000-1025	S Africa, Investment Ch	11985af	17735va	21745va	
		9875au	11655as	11800as	12025as	1000-1030	Switzerland, Swiss R Intl	6165eu	9535eu		
		13785as	15490as	15560as	15580as	1000-1100	United Kingdom, BBC WS	6190af	6195am	9410eu	9740as
		17755as	17860as					11750as	11760as	11940af	12095eu
0900-0925	S Africa, Investment Ch	17735va	21745va					15280as	15310as	15360as	15485va
0900-0930	Switzerland, Swiss R Intl	9885pa	12075au	13685pa				15565va	15575va	17640va	17705va
0900-1000	United Kingdom, BBC WS	6190af	6195as	9410eu	11750as	1000-1100 as	United Kingdom, BBC WS	15190am	15400am	17830af	
		11940af	12095eu	15190sa	15280as	1000-1100	USA, KAIJ Dallas TX	5810am	9815am		
		15360as	15400af	15485va	15565va	1000-1100	USA, KATN Salt Lk City UT	7510am			
		15575me	17640af	17705eu	17830af	1000-1100	USA, KWHR Naalehu HI	9930as			
		17885af				1000-1100	USA, Monitor Radio Intl	6095na	7395sa	15665as	15725as
0900-0915	United Kingdom, BBC WS	6065as	7325va	9580as	11760as	1000-1100	USA, Voice of America	5985pa	6165am	7405am	9590am
		11955as	15310as					11720pa	15425pa		
0900-1000	USA, KAIJ Dallas TX	5810am						7425na	15665eu		
0900-1000	USA, KATN Salt Lk City UT	7510am				1000-1100	USA, WEWN Birmingham AL	7425na			
0900-1000	USA, Monitor Radio Intl	7395sa	7535eu	13840au	15665as	1000-1100	USA, WGTG McCaysville GA	9400am			
0900-1000	USA, WEWN Birmingham AL	7425na	15665eu			1000-1100	USA, WHRI Noblesville IN	6040am	9495am	9930am	
0900-1000	USA, WGTG McCaysville GA	9400am				1000-1100	USA, WJCR Upton KY	7490na			
0900-1000	USA, WHRI Noblesville IN	6040am	9495am	9930am		1000-1100 as	USA, WVHA Greenbush ME	13825af			
0900-1000	USA, WJCR Upton KY	7490na				1000-1100	USA, WWCR Nashville TN	5070am	5935am	9475am	15685am
0900-1000 as	USA, WVHA Greenbush ME	13825af				1000-1100	USA, WYFR Okeechobee FL	5950na	7355na		
0900-1000	USA, WWCR Nashville TN	2390am	3210am	5070am	5935am	1000-1100 vl/m-f	Vatican State, Vatican R	5882eu	11740af	15210af	17550af
0900-1000	USA, WYFR Okeechobee FL	5950na				1000-1030	Vietnam, Voice of	5940as	7270as	7400as	9840as
0900-1000 vl	Zambia, Christian Voice	6065af						12020as	15010as		
0900-1000 vl	Zambia, R Zambia/ZNBC 1	7220do						6065af			
0900-1000 vl	Zimbabwe, Zimbabwe BC	5975do						7220do			
0915-1000	Bhutan, Bhutan BC Service	6035do				1030-1055 mtwhfa	Austria, R Austria Intl	6155eu	13730eu	15240as	17870au
0915-1000	Ghana, Ghana Broadc Corp	6130do	7295do			1030-1100	Bulgaria, Radio	9440as			
0930-1000 s	Armenia, Voice of	15270eu				1030-1057	Czech Rep, Radio Prague	7345eu	9505eu		
0930-1000	Canada, CKZN St John's	6160do				1030-1100	Ethiopia, Radio	5990do	7110do	9705do	
0930-1000	Netherlands, Radio	5965as	7260as	9810as	9830au	1030-1100	Guam, AWR/KSDA	9870as			
0930-1000	Philippines, FEBC/R Intl	11635as				1030-1100	Netherlands, Radio	7260as	9810as		
0930-0955	S Africa, Investment Ch	11985af	17735va	21745va		1030-1055	S Africa, Investment Ch	11985af	17735va	21745va	
0935-1000	Pakistan, Radio	17900eu				1030-1100	Sri Lanka, Sri Lanka BC	11835as	17850as		
0944-0949 vl	Kazakhstan, Radio Almaty	11840eu				1030-1055	UAE, Radio Dubai	13665eu	15395eu	17630eu	21605me

MT MONITORING TEAM

Next Reporting Deadline: April 22, 1997

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Dave Datko, CA	Lloyd VanHorn, NC	

THANK YOU ...

ADDITIONAL CONTRIBUTORS TO THIS MONTH'S SHORTWAVE GUIDE:

John Babbis, Silver Springs, MD; Bob Fraser, Cohasset, MA; Clyde Harmon, Anniston, AL; Frank Hillton, Charleston, SC; Jim Moats, Ravenna, OH; Larry Van Horn, Brasstown, NC; Alden E. Wires Jr., East Point, GA; BBCMS; BBC World Media; BBC Summary of World Broadcasts; Internet Shortwave Newsgroups; Cumbre DX; Fine Tuning; The Four Winds.

FREQUENCIES

1100-1200	Anguilla, Caribbean Beacon	11775am			1100-1200	Singapore, R Singapore Int	6105as	6155as	
1100-1200	Australia, Radio	9580pa	9615as	9860pa	12080pa	Sri Lanka, Sri Lanka BC	11835as	17850as	
		13605as	21725as			Switzerland, Swiss R Intl	9885as	11995as	13635as
1100-1200 vl	Australia, VL8A Alice Spg	2310do				Taiwan, Voice of Asia	7445as		
1100-1200 vl	Australia, VL8K Katherine	2485do				United Kingdom, BBC WS	5965am	6190af	9410eu
1100-1200 vl	Australia, VL8T Tent Crk	2325do					11760as	11930va	11940af
1100-1130	Bulgaria, Radio	9440as					15220am	15310as	15485va
1100-1200	Canada, CFCX Montreal	6005do					15575va	17640af	17790as
1100-1200	Canada, CFRX Toronto	6070do					17885af	21660af	17830af
1100-1200	Canada, CFVP Calgary	6030do					15190am		
1100-1200	Canada, CHNX Halifax	6130do					6195am	9700as	15400af
1100-1200	Canada, CKZN St John's	6160do					5810am		
1100-1200	Canada, CKZU Vancouver	6160do					7510am		
1100-1200	Costa Rica, Adv World R	7375am	9725am	13750am			9930as		
1100-1200	Costa Rica, RF Peace Intl	6205am	7385am				6095na	7395sa	9355eu
1100-1200	Ecuador, HCJB	12005am	15115am	21455au			5985as	6110as	9645as
1100-1200 as	Eqt Guinea, R East Africa	15186af					11705as	11720as	15425as
1100-1200	Eqt Guinea, Radio Africa	9530as					7425na	15665eu	
1100-1150	Germany, Deutsche Welle	15370af	15410af	17780af	17800af		6040am	9495am	
1100-1157	Iran, VOIRI	11875me	11930me	15260af			7490na		
1100-1200 vl	Italy, IRRS	7125va					13825eu		
1100-1200	Japan, R Japan/NHK World	6120na	7125na	11815as			5935am	7435am	9475am
1100-1200	Jordan, Radio	11690eu					5950na	11830na	11970na
1100-1200	Lebanon, Voice of Hope	9960va					7355na		
1100-1110	Liberia, LCN/R Liberia Int	5100do					7285as	9730as	
1100-1200	Malaysia, Radio	7295do					6065af		
1100-1200 vl	Malaysia, RTM Kuching	7160do					7220do		
1100-1200 vl	Malaysia, RTM Kota Kinabalu	5980do					6995as	11445as	11700as
1100-1125	Netherlands, Radio	7260as	9810as				15245as	17685au	
1100-1200	New Zealand, R NZ Intl	9700pa					7115eu		
1100-1150	North Korea, R Pyongyang	6575na	9975na	11335na			7115eu		
1100-1120	Pakistan, Radio	15470eu	17900eu				5990do		
1100-1130 as	Palau, KHBN/Voice of Hope	9730as					6045eu	7190eu	21745af
1100-1200 vl	Papua New Guinea, NBC	4890do					11985af	17735af	
1100-1200	Russia, Voice of Russia WS	4740as	9725as	9755as	9820as		9650am		
		9875as	11655as	11880as	13785as		17705va		
		15120as	17755as	17860as			Vatican State, Vatican R	15595as	17550au
		11985af	17735va	21745va			India, All India Radio	9595do	11620do
1100-1125	S Africa, Investment Ch							11710do	15185do

SELECTED PROGRAMS

Sundays

- 1100 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
 1100 Japan, NHK/Radio: News. See S 0300.
 1100 USA, KTNB Salt Lk City UT: Breakthrough. Rod Parsley conducts services from the World Harvest Church in Columbus, OH.
 1110 Japan, NHK/Radio: Hello from Tokyo. See S 0310.
 1120 Bulgaria, Radio: Questionline. Ten minutes of answers to listeners' questions.
 1155 Japan, NHK/Radio: News Summary. See S 0355.

Mondays

- 1100 Bulgaria, Radio: Folk Studio. Myths, legends, customs, and rituals associated with Bulgarian holidays.
 1100 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
 1100 Japan, NHK/Radio: Radio Japan News Round. Thirty minutes of world, regional, and Japanese news.
 1100 USA, KTNB Salt Lk City UT: Good News Today! T.L. Osborn evangelizes.
 1115 Bulgaria, Radio: Radio Bulgaria Calling. See M 0445.
 1130 Japan, NHK/Radio: Close Up. See M 0330.
 1130 Japan, NHK/Radio: Radio Japan Magazine Hour. See M 0315.
 1130 USA, KTNB Salt Lk City UT: The Doctor and the Word. Reginald B. Cherry, MD answers listeners' questions about medical matters.
 1140 Japan, NHK/Radio: Sports. A roundup of regional sports news.
 1145 Japan, NHK/Radio: Weekly Column. See S 2350.
 1155 Japan, NHK/Radio: News Summary. See S 0355.

Tuesdays

- 1100 Bulgaria, Radio: Science/Technology/Environment. A look at Bulgarian research and advancement in these activities.
 1100 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
 1100 Japan, NHK/Radio: Radio Japan News Round. See M 1100.
 1100 USA, KTNB Salt Lk City UT: Dean and Mary. Dean and Mary Brown with music that ministers.
 1115 Bulgaria, Radio: Across the Map of Bulgaria. A travelogue program of historical sites and interesting places and people.
 1130 Japan, NHK/Radio: Close Up. See M 0330.
 1130 Japan, NHK/Radio: Radio Japan Magazine Hour. See M 0315.
 1130 USA, KTNB Salt Lk City UT: A Date with Dale. See M 1530.

- 1145 Japan, NHK/Radio: Japanese Culture Today. See T 0340.
 1155 Japan, NHK/Radio: News Summary. See S 0355.

Wednesdays

- 1100 Bulgaria, Radio: Weekly Cultural Review. A 30-minute summary of cultural events in Bulgaria, cultural newstips, and regional music.
 1100 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
 1100 Japan, NHK/Radio: Radio Japan News Round. See M 1100.
 1100 Japan, NHK/Radio: Radio Japan News Round. See M 1100.
 1100 USA, KTNB Salt Lk City UT: The Laverne Tripp Family. Country christian music performed by Laverne and Edith Tripp and their kin.
 1130 Japan, NHK/Radio: Close Up. See M 0330.
 1130 Japan, NHK/Radio: Close Up. See M 0330.
 1130 Japan, NHK/Radio: Radio Japan Magazine Hour. See M 0315.
 1130 Japan, NHK/Radio: Radio Japan Magazine Hour. See M 0315.
 1130 USA, KTNB Salt Lk City UT: Up on Melody Mountain. See W 0030.
 1141 Japan, NHK/Radio: Asian Report. See W 0340.
 1145 Japan, NHK/Radio: Asian Report. See W 0340.
 1155 Japan, NHK/Radio: News Summary. See S 0355.
 1155 Japan, NHK/Radio: News Summary. See S 0355.

Thursdays

- 1100 Bulgaria, Radio: History Club. See S 0430.
 1100 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
 1100 Japan, NHK/Radio: Radio Japan News Round. See M 1100.
 1100 USA, KTNB Salt Lk City UT: The Answer. Dan Sheaffer answers listener questions about religion.
 1120 Bulgaria, Radio: Business and Finance. See M 2330.
 1130 Japan, NHK/Radio: Close Up. See M 0330.
 1130 Japan, NHK/Radio: Radio Japan Magazine Hour. See M 0315.
 1130 USA, KTNB Salt Lk City UT: Revivals in the Land Today. Walt Mills evangelizes.
 1145 Japan, NHK/Radio: Crosscurrents. See H 0340.
 1155 Japan, NHK/Radio: News Summary. See S 0355.

Fridays

- 1100 Bulgaria, Radio: Lifestyle. See H 2330.

- 1100 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
 1100 Japan, NHK/Radio: Radio Japan News Round. See M 1100.
 1100 USA, KTNB Salt Lk City UT: Origins. See T 2330.
 1115 USA, KTNB Salt Lk City UT: Reaching Higher. Rick Godwin teaches how to be successful as well as a christian.
 1130 Japan, NHK/Radio: Close Up. See M 0330.
 1130 Japan, NHK/Radio: Radio Japan Magazine Hour. See M 0315.
 1130 USA, KTNB Salt Lk City UT: Steve Brock. See H 1530.
 1145 Japan, NHK/Radio: Business Focus. See F 0340.
 1155 Japan, NHK/Radio: News Summary. See S 0355.

Saturdays

- 1100 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
 1100 Japan, NHK/Radio: News. See S 0300.
 1100 USA, KTNB Salt Lk City UT: Gospel Bill. Kids program.
 1110 Japan, NHK/Radio: This Week. See A 0310.
 1115 Bulgaria, Radio: Radio Bulgaria Calling. See M 0445.
 1155 Japan, NHK/Radio: News Summary. See S 0355.

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FREQUENCIES

1200-1300	Anguilla, Caribbean Beacon	11775am				1200-1300	United Kingdom, BBC WS	5965am	6065as	6190af	6195va
1200-1300	Australia, Radio	7150as	9580pa	9615as	9710as			9410eu	9580as	9740as	11750as
		9770as	9860pa	11660as	11800pa			11760as	11930va	11940af	11955as
1200-1300 vl	Australia, VL8A Alice Spg	2310do						15310as	15485va	15565va	15575me
1200-1300 vl	Australia, VL8K Katherine	2485do						17640af	17705va	17830af	17885af
1200-1300 vl	Australia, VL8T Tent Crk	2325do						21660af			
1200-1300	Brazil, Radio Bras	15445na				1200-1215	United Kingdom, BBC WS	15220am			
1200-1215	Cambodia, Natl Voice of	11940as				1200-1300	USA, KAIJ Dallas TX	5810am			
1200-1300 vl	Canada, CBC N Quebec Svc	9625do				1200-1300	USA, KTNB Salt Lk City UT	7510am			
1200-1300	Canada, CFCX Montreal	6005do				1200-1300	USA, KWHR Naalehu HI	9930as			
1200-1300	Canada, CFRX Toronto	6070do				1200-1300	USA, Monitor Radio Intl	6095na	9355as	9430au	9455sa
1200-1300	Canada, CFVP Calgary	6030do				1200-1300	USA, Voice of America	6110as	9760as	11705as	11715as
1200-1300	Canada, CHNX Halifax	6130do						15425as			
1200-1300	Canada, CKZN St John's	6160do				1200-1300	USA, WEWN Birmingham AL	7425na	11875na	15665eu	
1200-1300	Canada, CKZU Vancouver	6160do				1200-1300	USA, WGTG Mcaysville GA	9400am			
1200-1230	Canada, R Canada Intl	6150as	11730as			1200-1300	USA, WHRI Noblesville IN	6040am	15105am		
1200-1300	China, China Radio Intl	7385na	9565as	9715as	11660as	1200-1300	USA, WJCR Upton KY	7490na			
		11795pa	15440am			1200-1300 s	USA, WRMI/R Miami Intl	9955am			
1200-1230 vl	China, China Radio Intl	6995as		12110as		1200-1300	USA, WWCR Nashville TN	5935am	7435am	9475am	
1200-1300	Costa Rica, Adv World R	5030am	6150am	9725am	13750am	1200-1300	USA, WYFR Okeechobee FL	5950na	11830na	13695na	
1200-1300	Ecuador, HCBJ	12005am	15115am	21455am		1200-1245	USA, WYFR Okeechobee FL	11970am			
1200-1300 as	Eqt Guinea, R East Africa	15186af				1200-1230	Uzbekistan, R Tashkent	5060as	5975as	6025as	9715as
1200-1300	Eqt Guinea, Radio Africa	9530as				1200-1300	Zambia, Christian Voice	6065af			
1200-1300	France, Radio France Intl	11600va	15155eu	15195eu	15530af	1200-1300 vl	Zambia, R Zambia/ZNBC 1	7220do			
		15540am				1203-1210	Croatia, Croatian Radio	5895eu	7165eu	13830eu	
1200-1230	Iran, VOIRI	11875me	11930me	15260af		1207-1300 occsnal	New Zealand, R NZ Intl	6070pa			
1200-1300 vl	Italy, IRRS	7125va				1215-1300	Egypt, Radio Cairo	17595as			
1200-1300	Jordan, Radio	11690eu				1230-1300 as	Australia, Radio	5995pa			
1200-1300	Lebanon, Voice of Hope	9960va				1230-1300	Bangladesh, Bangla Betar	7185as	9550as		
1200-1300	Malaysia, Radio	7295do				1230-1255 s	Belgium, R Vlaanderen Int	13685va	13795va		
1200-1300 vl	Malaysia, RTM Kota Kinabalu	5980do				1230-1300 mtwhf	Finland, YLE/R Finland	11735na	15400na		
1200-1250	Myanmar, Voice of	5990do				1230-1235	India, All India Radio	4860do	6185do	17865do	
1200-1300	Netherlands, Radio	6045eu	7190eu			1230-1300 w	Indonesia, RRI Sorong	4875do			
1200-1206	New Zealand, R NZ Intl	9700pa				1230-1300	Mongolia, Voice of	12085as			
1200-1300 vl	Papua New Guinea, NBC	4890do				1230-1255	S Africa, Investment Ch	17735af	21745af		
1200-1255	Poland, Polish R Warsaw	6095eu	7145eu	7270eu	9525eu	1230-1300	Serbia, Radio Yugoslavia	11835eu			
		11815eu				1230-1300	South Korea, R Korea Intl	9570as	9640as	13670as	
1200-1300	Russia, Voice of Russia WS	4740as	4975as	9705as	15460as	1230-1300 mtwhf	Sri Lanka, Sri Lanka BC	9730as			
		17860as				1230-1300	Sweden, Radio	11650na	15240na		
1200-1225	S Africa, Investment Ch	11985af	17735af	21745af		1230-1300	Thailand, Radio	9505as	9655as	9810as	
1200-1300	Singapore, R Singapore Int	6105as	6155as			1230-1300	Turkey, Voice of	9445eu	9630as		
1200-1300	South Korea, R Korea Intl	7285af				1230-1300	Vietnam, Voice of	5940as	7270as	7400as	9840as
1200-1300	Switzerland, Swiss R Intl	6165eu	9535eu					12020as	15010as		
1200-1300	Taiwan, VO Free China	7130au	9610as			1240-1250	Greece, Voice of	17525af			

SELECTED PROGRAMS

Sundays

1200	France, R France Intl: News. World news, French news, press review, sports.	1238	France, R France Intl: News in Brief.
1200	USA, KTNB Salt Lk City UT: Cornerstone. Evangelizing by John Hagee and music by the Cornerstone Choir.	1241	France, R France Intl: Sports. A summary of the seasonal matches from around the continent.
1200	USA, WRMI/R Miami Intl, FL: Worship Time. A Sunday message from Newcastle, Maine.	1246	Sweden, Radio: SportScan. A weekly review of all the news in sports hosted by Keith Foster.
1215	USA, WRMI/R Miami Intl, FL: Faith and Truth. Ken Megilligan.	1247	France, R France Intl: Arts in France. Profile on the work of a French artist or a cultural activity such as music.
1216	France, R France Intl: African Analysis (biweekly). An in-depth analysis of African current affairs.		
1216	France, R France Intl: Asian Analysis (biweekly). An in-depth analysis of Asian current affairs.		
1223	France, R France Intl: Paris Promenade. Spotlight on a city bistro or restaurant.		
1228	France, R France Intl: Counterpoint (biweekly). A specific human rights issue is examined.		
1228	France, R France Intl: Everywoman (biweekly). A program for and about women.		
1230	Sweden, Radio: In Touch with Stockholm (biweekly). A mailbag program with on-the-air link-ups.		
1230	Sweden, Radio: Sounds Nordic (biweekly). The very latest and best in Swedish rock and pop music, interviews with the stars, and what's happening on the youth scene.		
1230	USA, WRMI/R Miami Intl, FL: The Scripture Hour. Evangelist Paul Fleming spreads the gospel from South Carolina.		
1233	France, R France Intl: News Headlines. A summary of today's news.		
1234	France, R France Intl: Club 9516. Listener letters are read in this mailbag program.		
1245	USA, WRMI/R Miami Intl, FL: Love of God. No information available.		

Mondays

1200	France, R France Intl: News. See S 1200.
1200	USA, KTNB Salt Lk City UT: Joy. Interviews with Christian authors and musicians.
1230	Sweden, Radio: Sixty Degrees North. Reports, interviews and analysis from Stockholm and other Nordic capitals.
1231	France, R France Intl: RFI Europe. European press review

Tuesdays

1200	France, R France Intl: News. See S 1200.
1200	USA, KTNB Salt Lk City UT: Joy. See M 1200.
1230	Sweden, Radio: Sixty Degrees North. See M 1230.
1230	USA, KTNB Salt Lk City UT: Alive! Jesuit Priest Michael Manning teaches Christian principles.
1231	France, R France Intl: RFI Europe. See M 1231.
1236	France, R France Intl: Letter from a Listener.
1239	France, R France Intl: News Headlines. See S 1233.
1242	France, R France Intl: Books. Publishing trends, authors.
1246	Sweden, Radio: MediaScan (1/3). Satellite news 85%; medium wave and shortwave news 15%.
1249	France, R France Intl: Science Probe. Developments in the world of science, technology, and health.

Wednesdays

1200	France, R France Intl: News. See S 1200.
1200	USA, KTNB Salt Lk City UT: Get in Shape. Pamela Carter takes you through an exercise program.
1230	Sweden, Radio: Sixty Degrees North. See M 1230.
1230	USA, KTNB Salt Lk City UT: Kids Club. Variety program.
1231	France, R France Intl: RFI Europe. See M 1231.
1238	France, R France Intl: News Headlines. See S 1233.
1242	France, R France Intl: The Bottom Line. Focus on finances.
1246	Sweden, Radio: Money Matters. Al Simon presents news about the Swedish economy, business, consumer affairs, and Sweden's EU membership.
1247	France, R France Intl: Land of France. A feature on life and times in France.

Thursdays

1200	France, R France Intl: News. See S 1200.
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1200	USA, KTNB Salt Lk City UT: Joy. See M 1200.
1230	Sweden, Radio: Sixty Degrees North. See M 1230.
1230	USA, KTNB Salt Lk City UT: Doctor to Doctor. See T 0430.
1231	France, R France Intl: Sports. See M 1241.
1234	France, R France Intl: RFI Europe. See M 1231.
1241	France, R France Intl: News Headlines. See S 1233.
1243	Sweden, Radio: GreenScan. Environmental concerns and solutions.
1244	France, R France Intl: The Americas Magazine. Focus on a subject relating to a country of the western hemisphere.
1246	Sweden, Radio: Horizon (4/5). Science and technology.
1249	France, R France Intl: North/South (biweekly). Focus on a public activity in France.
1249	France, R France Intl: Planet Earth (biweekly). An interview with an expert on ecological matters.

Fridays

1200	France, R France Intl: News. See S 1200.
1200	USA, KTNB Salt Lk City UT: Joy. See M 1200.
1230	Sweden, Radio: Sixty Degrees North. See M 1230.
1230	USA, KTNB Salt Lk City UT: The Joy of Music. Diane Bish takes you on a world music tour and plays one of the great organs at each location.
1231	France, R France Intl: RFI Europe. See M 1231.
1235	Sweden, Radio: A Review of the Newsweek. The major stories of the week, both from Sweden and their Nordic neighbors.
1239	France, R France Intl: News Headlines. See S 1233.
1241	France, R France Intl: Film Reel. Interview with an performer or film maker.
1248	France, R France Intl: Made in France. See H 1448.

Saturdays

1200	France, R France Intl: News. See S 1200.
1200	USA, KTNB Salt Lk City UT: Kids Against Crime. Talk about programs making a difference in the lives of youth.
1228	France, R France Intl: Spotlight on Africa. Correspondent reports and interviews on African affairs.
1230	Sweden, Radio: Spectrum (1). See S 0030.
1230	USA, KTNB Salt Lk City UT: Kids Club. See W 1230.
1245	France, R France Intl: News Headlines. See S 1233.
1247	France, R France Intl: French Lesson. Learn French by radio.



FREQUENCIES

1300-1400	Anguilla, Caribbean Beacon	6090am				1300-1400	United Kingdom, BBC WS	5965am	5990as	6065as	6190af
1300-1400	Australia, Radio	5995pa	9580pa	9615as	11800pa			6195va	9410eu	9515am	9580as
1300-1400 vl	Australia, VL8A Alice Spg	2310do						9590am	11750as	11760as	11940af
1300-1400 vl	Australia, VL8K Katherine	2485do						12095eu	15220am	15310as	15420af
1300-1400 vl	Australia, V8T Tent Crk	2325do						15485va	15565va	15575me	17640va
1300-1325 mtwhfa	Belgium, R Vlaanderen Int	13685na	13795as					17705va	17830af	17885af	21660af
1300-1320	Brazil, Radio Bras	15445na				1300-1400	USA, KAIJ Dallas TX	13815am			
1300-1400 vl	Canada, CBC N Quebec Svc	9625do				1300-1400	USA, KNLS Anchor Point AK	7365as			
1300-1400	Canada, CFCX Montreal	6005do				1300-1400	USA, KTNB Salt Lk City UT	7510am			
1300-1400	Canada, CFRX Toronto	6070do				1300-1400	USA, KWHR Naalehu HI	9930as			
1300-1400	Canada, CFVP Calgary	6030do				1300-1400	USA, Monitor Radio Intl	6095na	9355as	9455am	13840as
1300-1400	Canada, CHNX Halifax	6130do				1300-1400	USA, Voice of America	6110as	9645as	9760as	11705as
1300-1400	Canada, CKZN St John's	6160do						11715as	15425as		
1300-1400	Canada, CKZU Vancouver	6160do				1300-1400	USA, WEWN Birmingham AL	9455na	11875na	15665eu	
1300-1400	Canada, R Canada Intl	9640am	11855am			1300-1400	USA, WGTG McCaysville GA	9400am			
1300-1400	China, China Radio Intl	7385na	7410as	9715as	11660pa	1300-1400	USA, WHRI Noblesville IN	6040am	15105am		
1300-1400	Costa Rica, RF Peace Intl	6205am	7385am			1300-1400	USA, WJCR Upton KY	7490na			
1300-1330	Czech Rep, Radio Prague	13580eu	17485af			1300-1400 s	USA, WRMI/R Miami Intl	9955am			
1300-1400	Ecuador, HCJB	12005am	15115am	21455am		1300-1400 as	USA, WVHA Greenbush ME	15745na			
1300-1330	Egypt, Radio Cairo	17595as				1300-1400	USA, WWCN Nashville TN	9475am	12160am	13845am	15685am
1300-1400 as	Eqt Guinea, R East Africa	15186af				1300-1400	USA, WYFR Okeechobee FL	5950na	11830na	17760eu	
1300-1400	Eqt Guinea, Radio Africa	9530as				1300-1400	Zambia, Christian Voice	6065af			
1300-1330 vl	Italy, IRRS	7125va				1300-1400 vl	Zambia, R Zambia/ZNBC 1	7220do			
1300-1400	Jordan, Radio	11690eu				1315-1400 mtwhfa	Bhutan, Bhutan BC Service	5030do			
1300-1310	Liberia, LCN/R Liberia Int	5100do				1330-1355	Austria, R Austria Intl	6155eu	13730na		
1300-1400	Malaysia, Radio	7295do				1330-1357	Canada, R Canada Intl	6150as	9535as		
1300-1400 vl	Malaysia, RTM Kuching	7160do				1330-1400	China, Heilongjiang PBS	4840do			
1300-1400 vl	Malaysia, RTM Kota Kinabalu	5980do				1330-1400	Finland, YLE/R Finland	11735na	15400na		
1300-1400 occsnal	New Zealand, R NZ Intl	6070pa				1330-1400	Guam, AWR/KSDA	9650as			
1300-1350	North Korea, R Pyongyang	9345as	9640eu	11740as	15230as	1330-1400	India, All India Radio	11620as	13750as		
1300-1330 s	Norway, Radio Norway Intl	9590eu	9945as	11840na	15605au	1330-1400 vl	Italy, IRRS	3985va			
1300-1400 vl	Papua New Guinea, NBC	4890do				1330-1400	Netherlands, Radio	9895as	13700as	15585as	
1300-1400	Philippines, FEBC/R Intl	11995as				1330-1355	S Africa, Investment Ch	17735af	21745af		
1300-1400	Romania, R Romania Intl	9683eu	11940eu	15390eu	17745eu	1330-1400	Sweden, Radio	7155as	15240pa		
1300-1400	Russia, Voice of Russia WS	7130me	7165me	9470me	9840me	1330-1355	UAE, Radio Dubai	13665eu	15395eu	17630eu	21605me
		15205me				1330-1400	Uzbekistan, R Tashkent	5060as	5975as	6025as	9715as
1300-1325	S Africa, Investment Ch	17735af	17735	21745af		1330-1400	Vietnam, Voice of	5940eu	7270eu	7400eu	9840eu
1300-1400	Singapore, R Singapore Int	6105as	6155as					12020eu	15010eu		
1300-1400 mtwhf	Sri Lanka, Sri Lanka BC	9730as				1335-1345	Greece, Voice of	11645na	15175na		
1300-1330	Switzerland, Swiss R Intl	7230as	7480as	12075as	13635as	1345-1400	Anguilla, Caribbean Beacon	11775am			
1300-1330	Turkey, Voice of	9445eu	9630as			1345-1400	Vatican State, Vatican R	9500as	11625as		

SELECTED PROGRAMS

Sundays

- 1300 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 1300 USA, KTNB Salt Lk City UT: Spiritual Protocol. Pastor Earl Paulk preaches from Atlanta.
- 1300 USA, WGTG McCaysville GA: USA Radio News. World news from the USA Radio Network.
- 1300 USA, WRMI/R Miami Intl, FL: Universal Life. The radio program of the original christians in universal life.
- 1304 USA, WGTG McCaysville GA: The Gospel Hour. Oliver Reed provides music and inspiration from South Carolina.
- 1330 Sweden, R: In Touch with Stockholm (biweekly). See S 1230.
- 1330 Sweden, Radio: Sounds Nordic (biweekly). See S 1230.
- 1330 USA, WRMI/R Miami Intl, FL: Battle Cry Sounding. Deborah Green evangelizes.
- 1345 Vatican State, Vatican Radio: With Heart and Mind. See S 0250.
- 1352 Vatican State, Vatican Radio: On-the-Air. See S 0258.

Mondays

- 1300 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 1300 USA, KTNB Salt Lk City UT: A New Perspective. Richard and Lindsay Roberts evangelize from Tulsa, Oklahoma.
- 1300 USA, WGTG McCaysville GA: USA Radio News. See S 1300.
- 1304 USA, WGTG McCaysville GA: The Gospel Hour. See S 1304.
- 1330 Sweden, Radio: Sixty Degrees North. See M 1230.
- 1330 KTNB Salt Lk City: John Hagee Today. Evangelizing by John Hagee of the Cornerstone Church in San Antonio, TX.
- 1330 USA, WRMI/R Miami Intl, FL: Wavescan. Adventist World Radio's DX/Media program with Jeff White of WRMI.
- 1345 USA, WRMI/R Miami Intl, FL: Words of the Spirit. Scripture reading from New Mexico.
- 1345 Vatican State, Vatican Radio: To the Ends of the Earth. See M 0500.
- 1348 Sweden, Radio: SportScan. See M 1246.

Tuesdays

- 1300 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 1300 USA, KTNB Salt Lk City UT: A New Perspective. See M 1300.
- 1300 USA, WGTG McCaysville GA: USA Radio News. See S 1300.
- 1304 USA, WGTG McCaysville GA: The Gospel Hour. See S 1304.

- 1330 Sweden, Radio: Sixty Degrees North. See M 1230.
- 1330 USA, KTNB Salt Lk City UT: John Hagee Today. See M 1330.
- 1330 USA, WRMI/R Miami Intl, FL: Wavescan. See M 1330.
- 1345 USA, WRMI/R Miami Intl, FL: Words of the Spirit. See M 1345.
- 1345 Vatican State, Vatican Radio: A Room with a View of the Vatican. See T 0250.
- 1346 Sweden, Radio: MediaScan (1/3). See T 1246.
- 1359 Vatican State, Vatican Radio: Ask the Abbot. See M 2300.

Wednesdays

- 1300 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 1300 USA, KTNB Salt Lk City UT: A New Perspective. See M 1300.
- 1300 USA, WGTG McCaysville GA: USA Radio News. See S 1300.
- 1304 USA, WGTG McCaysville GA: The Gospel Hour. See S 1304.
- 1330 Sweden, Radio: Sixty Degrees North. See M 1230.
- 1330 USA, KTNB Salt Lk City UT: John Hagee Today. See M 1330.
- 1330 USA, WRMI/R Miami Intl, FL: Wavescan. See M 1330.
- 1345 WRMI/R Miami Intl: Words of the Spirit. See M 1345.
- 1345 Vatican State, Vatican Radio: The Rome Report. See W 0250.
- 1346 Sweden, Radio: Money Matters. See W 1246.

Thursdays

- 1300 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 1300 USA, KTNB Salt Lk City UT: A New Perspective. See M 1300.
- 1300 USA, WGTG McCaysville GA: USA Radio News. See S 1300.
- 1304 USA, WGTG McCaysville GA: The Gospel Hour. See S 1304.
- 1330 Sweden, Radio: Sixty Degrees North. See M 1230.
- 1330 USA, KTNB Salt Lk City UT: John Hagee Today. See M 1330.
- 1330 USA, WRMI/R Miami Intl, FL: Wavescan. See M 1330.
- 1343 Sweden, Radio: GreenScan. See H 1243.
- 1345 WRMI/R Miami Intl: Words of the Spirit. See M 1345.
- 1345 Vatican State, Vatican Radio: The Pope and the People. See M 0250.
- 1346 Sweden, Radio: Horizon (4/5). See H 1246.
- 1350 Vatican State, Vatican Radio: Pilgrim City. See H 0254.
- 1359 Vatican State, Vatican Radio: Postcards from Rome. See H 0304.

Fridays

- 1300 BWI Anguilla, The Caribbean Beacon : World University

- Network (Dr. Gene Scott).
- 1300 USA, KTNB Salt Lk City UT: A New Perspective. See M 1300.
- 1300 USA, WGTG McCaysville GA: USA Radio News. See S 1300.
- 1304 USA, WGTG McCaysville GA: The Gospel Hour. See S 1304.
- 1330 Sweden, Radio: Sixty Degrees North. See M 1230.
- 1330 USA, KTNB Salt Lk City UT: John Hagee Today. See M 1330.
- 1330 USA, WRMI/R Miami Intl, FL: Wavescan. See M 1330.
- 1335 Sweden, Radio: A Review of the Newweek. See F 1235.
- 1345 USA, WRMI/R Miami Intl, FL: Words of the Spirit. See M 1345.
- 1345 Vatican State, Vatican Radio: Then and Now. See F 0250.

Saturdays

- 1300 BWI Anguilla, The Caribbean Beacon : World University Network (Dr. Gene Scott).
- 1300 USA, KTNB Salt Lk City UT: Circle Square. A program for children in a hotel setting.
- 1300 USA, WGTG McCaysville GA: USA Radio News. See S 1300.
- 1304 USA, WGTG McCaysville GA: The Gospel Hour. See S 1304.
- 1330 Sweden, Radio: Spectrum (1). See S 0030.
- 1330 USA, KTNB Salt Lk City UT: Joy Junction. Fun and games for children from the Christian Television Network (CTN).
- 1351 Vatican State, Vatican Radio: Facing the Challenge. The difficulties of living in Rome.
- 1356 Vatican State, Vatican Radio: What Can I Do?. See T 2300.

HAUSER'S HIGHLIGHTS

QATAR: QBS

0345-0706	7210 kHz
1707-2130	7210
0707-1306	15395
1307-1706	11750

2nd transmitter

0345-2130	9570
(Wolfgang Büschel, BC-DX)	

FREQUENCIES

1400-1500	Algeria, R Algiers Intl	11715eu	15160eu	15205eu	1400-1425	S Africa, Investment Ch	17735me	21745me
1400-1500	Anguilla, Caribbean Beacon	11775am			1400-1500	Singapore, R Corp of Sing	6155do	
1400-1500	Australia, Radio	5995pa	9580pa	9860pa	1400-1500	Sri Lanka, Sri Lanka BC	9730as	
		11800pa	12080pa	11660as	1400-1430	Thailand, Radio	9530as	9655as
1400-1500 vl	Australia, VL8A Alice Spg	2310do			1400-1500	United Kingdom, BBC WS	9590as	11905as
1400-1500 vl	Australia, VL8T Katherine	2485do					9515am	6190af
1400-1500 vl	Australia, V18T Tent Crk	2325do					11940af	6195as
1400-1500 vl	Canada, CBC N Quebec Svc	9625do					15485va	9740as
1400-1500	Canada, CFCX Montreal	6005do					17705va	12095eu
1400-1500	Canada, CFRX Toronto	6070do			1400-1500	USA, KAIJ Dallas TX	13815am	15220am
1400-1500	Canada, CFVP Calgary	6030do			1400-1500	USA, KJES Mesquite NM	11715na	15310as
1400-1500	Canada, CHNX Halifax	6130do			1400-1500	USA, KTNB Salt Lk City UT	7510am	15575me
1400-1500	Canada, CKZN St John's	6160do			1400-1500	USA, Monitor Radio Intl	9355as	17640va
1400-1500	Canada, CKZU Vancouver	6160do			1400-1500	USA, Voice of America	6110as	7125as
1400-1500	Canada, R Canada Intl	9640am	11855am				9760as	7215as
1400-1500	China, China Radio Intl	7405na	9535as	9785as			15425as	15205me
1400-1500	Costa Rica, RF Peace Intl	6205am	7385am		1400-1500	USA, WEWN Birmingham AL	9455na	15665eu
1400-1500	Ecuador, HCJB	12005am	15115am	21455am	1400-1500	USA, WGTG McCaysville GA	9400am	
1400-1500 as	Eqt Guinea, R East Africa	15186af			1400-1500	USA, WHRI Noblesville IN	13760am	15105am
1400-1500	France, Radio France Intl	7110as	12030af	17560me	1400-1500	USA, WJCR Upton KY	7490na	
1400-1500	India, All India Radio	11620as	13750as		1400-1500 smtwhf	USA, WRMI/R Miami Intl	9955am	
1400-1430	Israel, Kol Israel	9390na	11605na		1400-1500	USA, WRNO New Orleans LA	7355am	
1400-1500 vl	Italy, IRRS	3985va			1400-1500 as	USA, WVHA Greenbush ME	15745na	
1400-1500	Japan, R Japan/NHK World	7125na	7200na	9535na	1400-1500	USA, WWCR Nashville TN	9475am	12160am
		11880as	11895as	12045as	1400-1500	USA, WYFR Okeechobee FL	11830na	13845am
1400-1500	Jordan, Radio	11690eu			1400-1405	Vatican State, Vatican R	9500as	15685am
1400-1500	Malaysia, Radio	7295do			1400-1500	Zambia, Christian Voice	6065af	
1400-1500 vl	Malaysia, RTM Kuching	7160do			1400-1500 vl	Zambia, R Zambia/ZNBC 1	7220do	
1400-1500 vl	Malaysia, RTM Kota Kinabalu	5980do			1415-1425	Nepal, Radio	7165do	
1400-1430	Mexico, Radio Mexico Intl	9705na			1420-1500 as	Palau, KBN/Voice of Hope	9985as	
1400-1500	Netherlands, Radio	9895as	13700as	15585as	1430-1500	Canada, R Canada Intl	9555me	11915af
1400-1500 occsna	New Zealand, R NZ Intl	6070pa			1430-1500 vl	China, China Radio Intl	6995as	11935me
1400-1430 s	Norway, Radio Norway Intl	11725as	11840as	11850as	1430-1440	India, All India Radio	3945do	8660as
1400-1410	Pakistan, Radio	9645as	9900as	11570me	1430-1440 mtwhf	Indonesia, RRI Uj Pandang	4753do	9880as
1400-1500 vl	Papua New Guinea, NBC	4890do			1430-1500	Mongolia, Voice of	9745eu	9565do
1400-1500	Philippines, FEBC/R Intl	11995as			1430-1500 mtwhf	Portugal, R Portugal Intl	21515as	12025au
1400-1500	Russia, Voice of Russia WS	4740me	4940me	4975me	1430-1500	Romania, R Romania Intl	11740as	15335as
		7115af	7130me	7165me	1430-1455	S Africa, Investment Ch	17735me	21745me
		7245af	7260af	7425af	1430-1500	Sweden, Radio	9485as	15240na
		9470af	9585af	9635me	1430-1500	United Kingdom, BBC WS	15400af	17830af
		15205me			1430-1500 vl	Zambia, R Zambia/ZNBC 2	6165do	21660af
					1440-1500	Myanmar, Voice of	5990do	

SELECTED PROGRAMS

Sundays

- 1400 France, R France Intl: News. See S 1200.
 1400 Radio Mexico Intl: Mailbag. Letters from English-speaking listeners are discussed on the air.
 1400 USA, KTNB Salt Lk City UT: Reinhard Bonnke Preaches. Evangelizing in Africa and elsewhere.
 1400 USA, WGTG McCaysville GA: Sounds of Joy. Bob Carlson with old recordings of sacred music.
 1416 France, R France Intl: African Analysis (biweekly). See S 1216.
 1416 France, R France Intl: Asian Analysis (biweekly). See S 1216.
 1422 France, R France Intl: Paris Promenade. See S 1223.
 1427 France, R France Intl: Everywoman. See S 1228.
 1430 Sweden, R: In Touch with Stockholm (biweekly). S 1230.
 1430 Sweden, Radio: Sounds Nordic (biweekly). See S 1230.
 1430 USA, KTNB Salt Lk City UT: Winning Walk. Ed Young sermonizes from Houston, TX.
 1433 France, R France Intl: Club 9516. See S 1234.

Mondays

- 1400 France, R France Intl: News. See S 1200.
 1400 Radio Mexico Intl: Antenna Radio Summary. A 15-minute magazine of news, finance, and culture.
 1400 USA, KTNB Salt Lk City UT: Breakthrough. See S 1100.
 1400 USA, WGTG McCaysville GA: Sermon and Song. A program from the Fundamental Broadcast Network hosted by evangelist Bennett Collins.
 1400 USA, WRMI/R Miami Intl, FL: Worship Time. See S 1200.
 1415 USA, WRMI/R Miami Intl, FL: Church of Christ. See M 0000.
 1430 Sweden, Radio: Sixty Degrees North. See M 1230.
 1430 KTNB Salt Lk City UT: Today with Marilyn. Hickey teaches.
 1430 USA, WGTG McCaysville GA: Family Altar. Lester Roloff evangelizes with a Texas flair.
 1430 USA, WRMI/R Miami Intl, FL: Viva Miami!. A magazine program hosted by Jeff White from and about Miami and Florida, that includes DX and international travel features and seasonal tropical weather updates.
 1431 France, R France Intl: RFI Europe. See M 1231.
 1440 France, R France Intl: Sports. See M 1241.
 1446 Sweden, Radio: SportScan. See M 1246.
 1447 France, R France Intl: Arts in France. See M 1247.

Tuesdays

- 1400 France, R France Intl: News. See S 1200.

- 1400 Radio Mexico Intl: Antenna Radio Summary. See M 1400.
 1400 USA, KTNB Salt Lk City UT: Breakthrough. See S 1100.
 1400 USA, WGTG McCaysville GA: Sermon and Song. See M 1400.
 1400 USA, WRMI/R Miami Intl, FL: Exceeding Faith. See S 1615.
 1415 USA, WRMI/R Miami Intl, FL: Faith and Truth. See S 1215.
 1430 Sweden, Radio: Sixty Degrees North. See M 1230.
 1430 USA, KTNB Salt Lk City UT: Today with Marilyn. See M 1430.
 1430 USA, WRMI/R Miami Intl, FL: Viva Miami!. See M 1430.
 1431 R France Intl: France Today. Current happenings in France.
 1433 France, R France Intl: RFI Europe. See M 1231.
 1442 France, R France Intl: Books. See T 1242.
 1446 Sweden, Radio: MediaScan (1/3). See T 1246.
 1449 France, R France Intl: Science Probe. See T 1249.

Wednesdays

- 1400 France, R France Intl: News. See S 1200.
 1400 Radio Mexico Intl: Antenna Radio Summary. See M 1400.
 1400 USA, KTNB Salt Lk City UT: Breakthrough. See S 1100.
 1400 USA, WGTG McCaysville GA: Sermon and Song. See M 1400.
 1400 USA, WRMI/R Miami Intl: The Voice of Reform. See W 0100.
 1401 Vatican State, Vatican Radio: What Can I Do? See T 2300.
 1430 Sweden, Radio: Sixty Degrees North. See M 1230.
 1430 USA, KTNB Salt Lk City UT: Today with Marilyn. See M 1430.
 1431 France, R France Intl: RFI Europe. See M 1231.
 1443 France, R France Intl: The Bottom Line. See W 1242.
 1446 France, R France Intl: Land of France. See W 1247.
 1446 Sweden, Radio: Money Matters. See W 1246.

Thursdays

- 1400 France, R France Intl: News. See S 1200.
 1400 Radio Mexico Intl: Antenna Radio Summary. See M 1400.
 1400 USA, KTNB Salt Lk City UT: Breakthrough. See S 1100.
 1400 USA, WGTG McCaysville GA: Sermon and Song. See M 1400.
 1400 USA, WRMI/R Miami Intl, FL: Wind and Fire. See S 1615.
 1415 USA, WRMI/R Miami Intl, FL: God's Miracle Hour. Gordon Gentry evangelizes from Florida.
 1430 Sweden, Radio: Sixty Degrees North. See M 1230.
 1430 USA, KTNB Salt Lk City UT: Today with Marilyn. See M 1430.
 1430 USA, WRMI/R Miami Intl, FL: Viva Miami!. See M 1430.
 1431 France, R France Intl: Sports. See M 1241.
 1435 France, R France Intl: RFI Europe. See M 1231.
 1443 France, R France Intl: North/South (biweekly). See H 1249.

- 1443 France, R France Intl: Planet Earth (biweekly). See H 1249.
 1443 France, R France Intl: The Americas Magazine (5). See H 1244.
 1443 Sweden, Radio: GreenScan. See H 1243.
 1446 Sweden, Radio: Horizon (4/5). See H 1246.
 1448 France, R France Intl: Made in France. A review of something very French.

Fridays

- 1400 France, R France Intl: News. See S 1200.
 1400 Radio Mexico Intl: Antenna Radio Summary. See M 1400.
 1400 USA, KTNB Salt Lk City UT: Breakthrough. See S 1100.
 1400 WGTG McCaysville: Sermon and Song. See M 1400.
 1400 USA, WRMI/R Miami Intl, FL: Wavescan. See M 1330.
 1415 USA, WRMI/R Miami Intl, FL: Christ Gospel Broadcast. See M 0115.
 1430 Sweden, Radio: Sixty Degrees North. See M 1230.
 1430 KTNB Salt Lk City: Today with Marilyn. See M 1430.
 1431 France, R France Intl: RFI Europe. See M 1231.
 1435 Sweden, Radio: A Review of the Newsweek. See F 1235.
 1441 France, R France Intl: Film Reel. See F 1241.
 1446 R France Intl: Counterpoint (biweekly). See S 1228.
 1446 France, R France Intl: Silk Roads (biweekly). Focus on South Asia.

Saturdays

- 1400 France, R France Intl: News. See S 1200.
 1400 Radio Mexico Intl: Mirror of Mexico. See W 1500.
 1400 USA, KTNB Salt Lk City UT: Just the Facts. A program for youth ages 10 to 16.
 1400 WGTG McCaysville: Liberty Hall. A patriot radio program.
 1400 Vatican State, Vatican Radio: Faith by Numbers. A numerical Catholic Catechism.
 1425 France, R France Intl: Focus on France. Zooming in on a French news item.
 1430 Sweden, Radio: Spectrum (1). See S 0030.
 1430 USA, KTNB Salt Lk City UT: Becky's Barn. A puppet program for children.
 1434 France, R France Intl: Asia File. Correspondent reports and interviews on Asian affairs.

FREQUENCIES

1500-1600	Anguilla, Caribbean Beacon	11775am				1500-1545 s	Seychelles, FEBA Radio	11600as			
1500-1600	Australia, Radio	5995pa	6060pa	6080pa	7380as	1500-1515 wh	Seychelles, FEBA Radio	11870as			
		9615as	9850pa	11660as	11800pa	1500-1530 mt fa	Seychelles, FEBA Radio	11870as			
		12080pa				1500-1600	Singapore, R Corp of Sing	6155do			
1500-1600 vl	Australia, VL8K Alice Spg	2310do				1500-1530	Switzerland, Swiss R Intl	9885as	12075as	13635as	
1500-1600 vl	Australia, VL8K Katherine	2485do				1500-1600	United Kingdom, BBC WS	5975as	5990as	6190af	6195as
1500-1600 vl	Australia, VL8T Tent Crk	2325do						9410va	9515na	9590am	9740am
1500-1600 vl	Canada, CBC N Quebec Svc	9625do						11750as	12095as	15220am	15400af
1500-1600	Canada, CFCX Montreal	6005do						15485af	15565va	15575eu	17640va
1500-1600	Canada, CFRX Toronto	6070do						17705eu	17830af	17840am	21470af
1500-1600	Canada, CFPV Calgary	6030do						21660af			
1500-1600	Canada, CHNX Halifax	6130do				1500-1530	United Kingdom, BBC WS	11860af	11940af	15420af	17880af
1500-1600	Canada, CKZN St John's	6160do						21490af			
1500-1600	Canada, CKZU Vancouver	6160do				1500-1600	USA, KAIJ Dallas TX	13815am			
1500-1600 s	Canada, R Canada Intl	9640am	11855am			1500-1600	USA, KTBN Salt Lk City UT	7510am			
1500-1600	China, China Radio Intl	7405na	9535as	9785as		1500-1600	USA, Monitor Radio Intl	9355as			
1500-1600	Costa Rica, RF Peace Intl	6205am	7385am	15050am		1500-1600	USA, Voice of America	6110as	7125as	7215as	9575me
1500-1600	Ecuador, HCJB	12005am	15115am	21455am				9645as	9760as	15205as	15395as
1500-1600 as	Eqt Guinea, R East Africa	15186af				1500-1600	USA, WEWN Birmingham AL	11875na			
1500-1600	Guam, TWR/KTWR	11580as				1500-1600	USA, WGTG McCaysville GA	9400am			
1500-1600 t	Ireland, W Coast R Ireland	5970eu				1500-1600	USA, WHRI Noblesville IN	13760am	15105am		
1500-1600 vl	Italy, IRRS	3985va				1500-1600	USA, WJCR Upton KY	7490na			
1500-1600	Japan, R Japan/NHK World	7200af	7240af	9535na	15355af	1500-1600 mtwhf	USA, WRMI/R Miami Intl	9955am			
1500-1600	Jordan, Radio	11690eu				1500-1600	USA, WRNO New Orleans LA	7355am			
1500-1510	Liberia, LCN/R Liberia Int	5100do				1500-1600 as	USA, WVHA Greenbush ME	15745va			
1500-1600	Malaysia, Radio	7295do				1500-1600	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1500-1600 vl	Malaysia, RTM Kuching	7160do				1500-1600	USA, WYFR Okeechobee FL	11830na	15215na	15695eu	17555eu
1500-1600 vl	Malaysia, RTM Kota Kinabalu	5980do						17760eu	21525af		
1500-1530	Mexico, Radio Mexico Intl	9705na				1500-1600	Zambia, Christian Voice	6065af			
1500-1515 s	Myanmar, Voice of	5990do				1500-1600 vl	Zambia, R Zambia/ZNBC 1	4910do			
1500-1525	Netherlands, Radio	9895as	13700as	15585as		1500-1600 vl	Zambia, R Zambia/ZNBC 2	6165do			
1500-1600 cccsnal	New Zealand, R NZ Intl	6070pa				1515-1530	Vatican State, Vatican R	5880eu	7250eu	9645eu	11810eu
1500-1550	North Korea, R Pyongyang	9325eu	9640eu	9975na	13785me	1520-1530 mtwhf	Estonia, Radio	5925eu			
1500-1530 as	Palau, KHBH/Voice of Hope	9985as				1530-1555	Austria, R Austria Intl	6155as	9655me	11780as	13730af
1500-1600 vl	Papua New Guinea, NBC	4890do				1530-1600	Georgia, Radio	6230me			
1500-1600	Philippines, FBBC/R Intl	11995as				1530-1545	India, All India Radio	3945do	6185do	7140do	7410do
1500-1530	Romania, R Romania Intl	11740as	15335as					9530do	9565do	9685do	9700do
1500-1600	Russia, Voice of Russia WS	4740me	4940me	4975me	6175me			9910do	11740do		
		7115af	7175af	7210af	7260as	1530-1600	Iran, VOIRI	7290as	9635as		
		7275af	7330eu	7425af	9470me	1530-1600	Netherlands, Radio	9895as	12090as		
		9505me	9550af	9585af	9635af	1530-1555	S Africa, Investment Ch	17735va	21745va		
		11865af	13670af	15205me		1530-1600 mtwhf	Sri Lanka, Sri Lanka BC	9730as			
1500-1600 sm	Russia, Voice of Russia WS	6005me				1530-1600 mtwhf	United Kingdom, BBC WS	7180as			
1500-1600	S Africa, Channel Africa	7155af	9685af			1530-1600	United Kingdom, BBC WS	17705va			
1500-1525	S Africa, Channel Africa	17735va	21745va			1545-1600	Pakistan, Radio	9425as	9515as	11570af	11955af
1500-1600 mtwhf	Seychelles, FEBA Radio	9810as						13590af	15555af		
						1550-1600 a/vl	Vatican State, Vatican R	9940as	11640as		

SELECTED PROGRAMS

Sundays

- 1500 Japan, NHK/Radio: News. See S 0300.
 1500 Radio Mexico Intl: The World of Mexican Art. Focus on the life of a star of stage, screen or other art form.
 1500 USA, KTBN Salt Lk City UT: The Coral Ridge Hour. D. James Kennedy talks about public education issues.
 1500 USA, WGTG McCaysville GA: Bible Believers Broadcast. Tony York preaches from Virginia.
 1510 Japan, NHK/Radio: Hello from Tokyo. See S 0310.
 1530 USA, WGTG McCaysville GA: Bryan Hoover. Bryan Hoover evangelizes from Pennsylvania.
 1550 Vatican State, Vatican Radio: Focus on the Church. News about the church in the region and around the world.
 1555 Japan, NHK/Radio: News Summary. See S 0355.

Mondays

- 1500 Japan, NHK/Radio: News. See S 0300.
 1500 USA, WGTG McCaysville GA: Larry Nichols (live). An hour of anti-Government, anti-Clinton pap.
 1500 USA, WRMI/R Miami Intl, FL: The Derry Brownfield Show (live). A political talk radio program.
 1511 Japan, NHK/Radio: Asian Top News. The most important stories from other Asian media organizations are summarized in a new 10-minute format.
 1521 Japan, NHK/Radio: Profile. An in-depth interview with a Japanese personality.
 1530 USA, KTBN Salt Lk City UT: A Date with Dale. Dale Evans Rogers sings and talks with a guest.
 1550 Vatican State, Vatican Radio: Activities of the Pope. A review of the major activities of the Pope during the past week.
 1551 Japan, NHK/Radio: Tokyo Pop-In. See S 2355.
 1555 Japan, NHK/Radio: News. See S 0300.

Tuesdays

- 1500 Japan, NHK/Radio: News. See S 0300.
 1500 Radio Mexico Intl: Mailbag. See S 1400.
 1500 WGTG McCaysville: Larry Nichols (live). See M 1500.
 1500 USA, WRMI/R Miami Intl, FL: The Derry Brownfield Show

- (live). See M 1500.
 1511 Japan, NHK/Radio: Asian Top News. See M 1511.
 1521 Japan, NHK/Radio: Enjoy Japanese. Learn and practice the Japanese language.
 1530 USA, KTBN Salt Lk City UT: Doctor to Doctor. See T 0430.
 1550 Vatican State, Vatican Radio: The Holy Scripture. A weekly, bible-based feature program for South Asia.
 1551 Japan, NHK/Radio: Tokyo Pop-In. See S 2355.
 1555 Japan, NHK/Radio: News Summary. See S 0355.

Wednesdays

- 1500 Japan, NHK/Radio: News. See S 0300.
 1500 Radio Mexico Intl: Mirror of Mexico. Focus on manufacturing and industry in Mexico.
 1500 WGTG McCaysville: Larry Nichols (live). See M 1500.
 1500 USA, WRMI/R Miami Intl, FL: The Derry Brownfield Show (live). See M 1500.
 1511 Japan, NHK/Radio: Asian Top News. See M 1511.
 1521 Japan, NHK/Radio: Town and Around. Take a half-hour guided tour of the cities and towns of Japan.
 1530 USA, KTBN Salt Lk City UT: Get in Shape. See W 1200.
 1550 Vatican State, Vatican Radio: News of the Church. See S 0333.
 1551 Japan, NHK/Radio: Tokyo Pop-In. See S 2355.
 1555 Japan, NHK/Radio: News Summary. See S 0355.
 1555 Vatican State, Vatican Radio: Mailbox. Letters from listeners are read on-the-air and frequency changes are announced when planned.

Thursdays

- 1500 Japan, NHK/Radio: News. See S 0300.
 1500 Radio Mexico Intl: The World of Mexican Art. See S 1500.
 1500 WGTG McCaysville: Larry Nichols (live). See M 1500.
 1500 USA, WRMI/R Miami Intl, FL: The Derry Brownfield Show (live). See M 1500.
 1511 Japan, NHK/Radio: Asian Top News. See M 1511.
 1521 Japan, NHK/Radio: Enjoy Japanese. See T 1521.
 1530 USA, KTBN Salt Lk City UT: Steve Brock. Steve sings songs of praise.

- 1551 Japan, NHK/Radio: Tokyo Pop-In. See S 2355.
 1555 Japan, NHK/Radio: News Summary. See S 0355.

Fridays

- 1500 Japan, NHK/Radio: News. See S 0300.
 1500 Radio Mexico Intl: Tour Through Mexico. See H 0400.
 1500 WGTG McCaysville: Larry Nichols (live). See M 1500.
 1500 USA, WRMI/R Miami Intl, FL: The Derry Brownfield Show (live). See M 1500.
 1515 Japan, NHK/Radio: Asian Top News. See M 1511.
 1521 Japan, NHK/Radio: Music and Book Beat. What people in Japan are listening to and reading.
 1530 USA, KTBN Salt Lk City UT: Praise the Lord. See M 0200.
 1550 Vatican State, Vatican Radio: News from the African Church. See M 0320.
 1551 Japan, NHK/Radio: Tokyo Pop-In. See S 2355.
 1555 Japan, NHK/Radio: News Summary. See S 0355.

Saturdays

- 1500 Japan, NHK/Radio: News. See S 0300.
 1500 KTBN Salt Lk City: Quigley's Village. Mr. Quigley and his puppet friends, wholesome entertainment for children.
 1500 USA, WGTG McCaysville GA: Biblical Studies Institute. See M 0300.
 1510 Japan, NHK/Radio: Asia Weekly. News from other Asian broadcasters, entertainment update, music.
 1514 Japan, NHK/Radio: Asia Kaleidoscope. Life in Japan and the region.
 1527 Japan, NHK/Radio: Echoes of Asia. Focus on regional music and musical instruments.
 1530 USA, KTBN Salt Lk City UT: Gospel Bill. See A 1100.
 1530 USA, WGTG McCaysville GA: Biblical Studies Institute. See M 0300.
 1538 Japan, NHK/Radio: Who's Who in Asia. Lifestyle in the Asia-Pacific region.
 1550 Japan, NHK/Radio: Asian News Summary of the Week. News headlines from other Asian news services.
 1555 Japan, NHK/Radio: News Summary. See S 0355.

FREQUENCIES

1600-1700	Anguilla, Caribbean Beacon	11775am				1600-1700	Swaziland, Trans World R	9500af			
1600-1700	Australia, Radio	5995pa	6060pa	6080pa	6090pa	1600-1700	Switzerland, Swiss R Intl	7410eu			
		9580pa	9615pa	9860pa	11660pa	1600-1640	UAE, Radio Dubai	11795me		15395me	17825me
		11800pa	12080pa			1600-1700	United Kingdom, BBC WS	3915as	5975as	6190af	7135va
1600-1700 vl	Australia, VLBA Alice Spg	2310do						9410va	9515am	11750as	11940af
1600-1700 vl	Australia, VLBA Katherine	2485do						12095as	15400af	15485eu	17830af
1600-1700 vl	Australia, VLBT Tent Crk	2325do						17840am	21470af	21660af	
1600-1700 vl	Canada, CBC N Quebec Svc	9625do				1600-1615 mtwhf	United Kingdom, BBC WS	7180as			
1600-1700	Canada, CFCX Montreal	6005do				1600-1615	United Kingdom, BBC WS	5990as	6195as	9510as	9740as
1600-1700	Canada, CFRX Toronto	6070do						15420af	15575va	17705af	
1600-1700	Canada, CFVP Calgary	6030do				1600-1615 as	United Kingdom, BBC WS	11860af			
1600-1700	Canada, CHNX Halifax	6130do				1600-1700	USA, KAIJ Dallas TX	13815am			
1600-1700	Canada, CKZN St John's	6160do				1600-1700	USA, KTNB Salt Lk City UT	15590am			
1600-1700	Canada, CKZU Vancouver	6160do				1600-1700	USA, KVOH Los Angeles CA	17775na			
1600-1700 s	Canada, R Canada Intl	9640am	11855am			1600-1700	USA, KWHR Naalehu HI	6120as			
1600-1700	China, China Radio Intl	15110af	15130af			1600-1700	USA, Monitor Radio Intl	9385af	11550eu	18930af	
1600-1700	Costa Rica, RF Peace Intl	6205am	7385am	15050am		1600-1700	USA, Voice of America	6035af	6110as	7125as	7215as
1600-1627	Czech Rep, Radio Prague	5930eu	9430af					9575as	9645as	9760as	11920af
1600-1700	Ethiopia, Radio	7165af	9560af	11800af				12040af	13600af	13710af	15205af
1600-1700	France, Radio France Intl	6175eu	9485af	11615me	11700af			15225af	15395as	15410af	15445af
		12015af	15530af					17895af			
1600-1650	Germany, Deutsche Welle	6150as	6170as	7225as	7305as	1600-1700	USA, WEWN Birmingham AL	11875na	13615na	15665eu	
		9585as				1600-1700	USA, WGTG McCaysville GA	9400am			
1600-1700	Germany, Deutsche Welle	7195af	9485af	9735af	11810af	1600-1700	USA, WHRI Noblesville IN	13760am	15105am		
		13610af	15145af			1600-1700	USA, WJCR Upton KY	7490na			
1600-1700	Guam, AWR/KSDA	7400as				1600-1700 smtwhf	USA, WMLK Bethel PA	9465eu			
1600-1630	Iran, VOIRI	7290as	9635as			1600-1615 mtwhf	USA, WRMI/R Miami Intl	9955am			
1600-1700 vl	Italy, IRRS	3985va				1600-1700	USA, WRNO New Orleans LA	7355am			
1600-1630	Jordan, Radio	11690eu				1600-1700	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1600-1700	Malaysia, Radio	7295do				1600-1700	USA, WYFR Okeechobee FL	15695eu	17555eu		
1600-1625	Netherlands, Radio	9895as	12090as			1600-1630 a	Vatican State, Vatican R	9940as	11640as		
1600-1650 occsnal	New Zealand, R NZ Intl	6070pa				1600-1620 smtwhf	Vatican State, Vatican R	9940as	11640as		
1600-1630 s	Norway, Radio Norway Intl	9590af	9985eu	11840na		1600-1630	Vietnam, Voice of	7400eu	9840eu		
1600-1630	Pakistan, Radio	7230as	9425as	9515as	11570af	1600-1700	Zambia, Christian Voice	3330af	4965af		
		11955af	13590af	15555af		1600-1700 vl	Zambia, R Zambia/ZNBC 1	4910do			
1600-1700 vl	Papua New Guinea, NBC	4890do				1600-1700 vl	Zambia, R Zambia/ZNBC 2	6165do			
1600-1700	Russia, Voice of Russia WS	4740me	4920eu	5940eu	6110eu	1615-1630	Albania, R Tirana Intl	6185eu	7155eu		
		6130eu	7115af	7130me	7175af	1615-1700	United Kingdom, BBC WS	9510as	11860af		
		7180eu	7210me	7255me	7260af	1630-1655	Austria, R Austria Intl	11780as			
		7275me	7305af	7325af	7330eu	1630-1700	Canada, R Canada Intl	7150as	9550as		
		7440eu	9505af	9550af	9585af	1630-1700	Egypt, Radio Cairo	15255af			
		9890eu	13670af			1630-1655	S Africa, Investment Ch	17735va			
1600-1700	S Africa, Channel Africa	7155af	9685af	15240af		1630-1700	Slovakia, Adv World Radio	15620af			
1600-1625	S Africa, Investment Ch	17735va				1630-1700	Slovakia, R Slovakia Intl	5915eu	6055eu	7345eu	
1600-1700	Singapore, R Corp of Sing	6155do				1645-1700 irreg	Afghanistan, Radio	7200as			
1600-1700	Slovakia, Adv World Radio	13590as				1650-1700	Eqt Guinea, Radio Africa	15186af			
1600-1700	South Korea, R Korea Intl	5975eu	9515af	9870af		1650-1700 mtwhf	New Zealand, R NZ Intl	6070pa			

SELECTED PROGRAMS

Sundays

- 1600 France, R France Intl: News. See S 1200.
 1600 USA, KTNB Salt Lk City UT: Love Worth Finding. Adrian Rogers conducts Sunday services from Memphis, Tennessee.
 1600 WGTG McCaysville: World of Prophecy. See S 0200.
 1600 Vatican State, Vatican Radio: The Background. Weekly interview program.
 1602 Vatican State, Vatican Radio: News. See S 0152.
 1615 USA, WRMI/R Miami Intl, FL: Victory Through the Word. No information available.
 1615 Vatican State, Vatican Radio: News. See S 0152.
 1619 France, R France Intl: Everywoman (biweekly). See S 1228.
 1619 France, R France Intl: Health Concerns (biweekly). Reports on medicine, fitness, and ecology.
 1622 France, R France Intl: Paris Promenade. See S 1223.
 1626 R France Intl: African Analysis (biweekly). See S 1216.
 1626 France, R France Intl: Echoes from Africa (biweekly). An African music program.
 1631 France, R France Intl: News Headlines. See S 1233.
 1632 France, R France Intl: Club 9516. See S 1234.

Mondays

- 1600 France, R France Intl: News. See S 1200.
 1600 USA, KTNB Salt Lk City UT: The Music of Praise. Ray Jones plays contemporary christian music.
 1600 USA, WGTG McCaysville GA: The Apocalypse Chronicles (live). James Lloyd of Oregon with scripture reading and bible prophecy.
 1600 USA, WRMI/R Miami Intl, FL: News You Can Use (live). A program of national and international news and commentary for the Viking companies of Arizona.
 1602 Vatican State, Vatican Radio: News. See S 0152.
 1615 Vatican State, Vatican Radio: News. See S 0152.
 1631 France, R France Intl: RFI Europe. See M 1231.
 1638 France, R France Intl: News Headlines. See S 1233.

- 1640 France, R France Intl: Sports. See M 1241.
 1647 France, R France Intl: Arts in France. See M 1247.

Tuesdays

- 1600 France, R France Intl: News. See S 1200.
 1600 USA, KTNB Salt Lk City UT: The Music of Praise. See M 1600.
 1600 USA, WGTG McCaysville GA: The Apocalypse Chronicles (live). See M 1600.
 1600 WRMI/R Miami Intl: News You Can Use (live). See M 1600.
 1602 Vatican State, Vatican Radio: News. See S 0152.
 1615 Vatican State, Vatican Radio: News. See S 0152.
 1633 France, R France Intl: RFI Europe. See M 1231.
 1640 France, R France Intl: News Headlines. See S 1233.
 1642 France, R France Intl: Books. See T 1242.
 1647 France, R France Intl: Drumbeat. African feature.

Wednesdays

- 1600 France, R France Intl: News. See S 1200.
 1600 USA, KTNB Salt Lk City UT: The Music of Praise. See M 1600.
 1600 USA, WGTG McCaysville GA: The Apocalypse Chronicles (live). See M 1600.
 1600 WRMI/R Miami Intl: News You Can Use (live). See M 1600.
 1602 Vatican State, Vatican Radio: News. See S 0152.
 1615 Vatican State, Vatican Radio: News. See S 0152.
 1631 France, R France Intl: RFI Europe. See M 1231.
 1638 France, R France Intl: News Headlines. See S 1233.
 1641 France, R France Intl: The Bottom Line. See W 1242.
 1646 France, R France Intl: Land of France. See W 1247.

Thursdays

- 1600 France, R France Intl: News. See S 1200.
 1600 USA, KTNB Salt Lk City UT: The Music of Praise. See M 1600.
 1600 USA, WGTG McCaysville GA: The Apocalypse Chronicles (live). See M 1600.
 1600 USA, WRMI/R Miami Intl, FL: News You Can Use (live). See M 1600.

- 1602 Vatican State, Vatican Radio: News. See S 0152.
 1615 Vatican State, Vatican Radio: News. See S 0152.
 1630 France, R France Intl: Sports. See M 1241.
 1632 France, R France Intl: RFI Europe. See M 1231.
 1639 France, R France Intl: News Headlines. See S 1233.
 1641 France, R France Intl: North/South (biweekly). See H 1249.
 1641 France, R France Intl: Planet Earth (biweekly). See H 1249.
 1646 France, R France Intl: Science Probe. See T 1249.

Fridays

- 1600 France, R France Intl: News. See S 1200.
 1600 KTNB Salt Lk City UT: The Music of Praise. See M 1600.
 1600 USA, WGTG McCaysville GA: The Apocalypse Chronicles (live). See M 1600.
 1600 WRMI/R Miami Intl: News You Can Use (live). See M 1600.
 1602 Vatican State, Vatican Radio: News. See S 0152.
 1615 Vatican State, Vatican Radio: News. See S 0152.
 1631 France, R France Intl: RFI Europe. See M 1231.
 1638 France, R France Intl: News Headlines. See S 1233.
 1641 France, R France Intl: Film Reel. See F 1241.
 1646 France, R France Intl: Made in France. See H 1448.

Saturdays

- 1600 France, R France Intl: News. See S 1200.
 1600 USA, KTNB Salt Lk City UT: Kids Like You. Miss Cathie hosts this program for children.
 1600 USA, WGTG McCaysville GA: Word of Prophecy. Ray Pringle evangelizes from Jacksonville, Florida.
 1614 France, R France Intl: Focus on France. See A 1425.
 1615 USA, WGTG McCaysville GA: Family Altar. See M 1430.
 1615 Vatican State, Vatican Radio: News. See S 0152.
 1630 USA, KTNB Salt Lk City UT: Colby's Clubhouse. A program by kids and for kids.
 1630 USA, WGTG McCaysville GA: Way of Salvation. The songs and Bob Terry's message come from Millers Baptist Church.
 1631 France, R France Intl: Spotlight on Africa. See A 1228.
 1645 France, R France Intl: French Lesson. See A 1247.



FREQUENCIES

1700-1800	Anguilla, Caribbean Beacon	11775am			
1700-1800	Australia, Radio	6060pa	6080pa	6090pa	9580pa
		9615as	9860pa	11660pa	11880pa
		12080pa			
1700-1800 vl	Australia, VL8A Alice Spg	2310do			
1700-1800 vl	Australia, VL8K Katherine	2485do			
1700-1800 vl	Australia, VL8T Tent Crk	2325do			
1700-1800 vl	Canada, CBC N Quebec Svc	9625do			
1700-1800	Canada, CFCX Montreal	6005do			
1700-1800	Canada, CFRX Toronto	6070do			
1700-1800	Canada, CFVP Calgary	6030do			
1700-1800	Canada, CHNX Halifax	6130do			
1700-1800	Canada, CKZN St John's	6160do			
1700-1800	Canada, CKZU Vancouver	6160do			
1700-1800	China, China Radio Intl	5220af	7150af	7405af	9570af
1700-1730	China, China Radio Intl	6965af	7335af		
1700-1800 as	Costa Rica, Adv World R	13750am			
1700-1800	Costa Rica, RF Peace Intl	15050am			
1700-1727	Czech Rep, Radio Prague	5835eu	9430af		
1700-1800	Egypt, Radio Cairo	15255af			
1700-1800	Eqt Guinea, Radio Africa	15186af			
1700-1730	France, Radio France Intl	9485af	11615af	12015me	
1700-1730	Georgia, Radio	6080eu			
1700-1800	Japan, R Japan/NHK World	6035na	7200na	7225na	9535na
		11880as	11905	15205me	
1700-1752 mtwhf	New Zealand, R NZ Intl	6070pa			
1700-1750	North Korea, R Pyongyang	9325eu	9640af	9975af	13785me
1700-1800 vl	Papua New Guinea, NBC	4890do			
1700-1755	Poland, Polish R Warsaw	6000eu	6095eu	7270eu	7285eu
1700-1800	Russia, Voice of Russia WS	6130eu	7175af	7180eu	7260af
		7305af	7325af	7440eu	9505af
		9890eu	13670af		
		7155af	9685af		
1700-1755	S Africa, Channel Africa	17735va			
1700-1725	S Africa, Investment Ch	5850af	9885af	9905af	
1700-1730	Switzerland, Swiss R Intl	3955eu	5975as	6090va	6180va
1700-1800	United Kingdom, BBC WS	6190af	6195eu	9410va	9510as
		9740as	11750as	11940af	12095eu
		15400af	15420af	15485eu	15575af
		17830af	17840af		
1700-1745	United Kingdom, BBC WS	3915as	7135as	9630af	11860af
1700-1800	USA, KAIJ Dallas TX	13815am			
1700-1800	USA, KTNB Salt Lk City UT	15590am			
1700-1800	USA, KWHR Naalehu HI	6120as			
1700-1800	USA, Monitor Radio Intl	9355eu	11550eu	18930af	
1700-1800	USA, Voice of America	6035af	6040eu	6110as	7125as
		7215as	9645as	9760me	11920eu
		12040af	13600eu	13710af	15205me
		15395as	15410af	15445af	17895eu
1700-1800 mtwhf	USA, Voice of America	5990as	6045as	9525as	9670as
		9770as	9795as	12005as	
		11875na	13615na	17695eu	
1700-1800	USA, WEWN Birmingham AL	9400am			
1700-1800	USA, WGTG McCaysville GA	9495am			
1700-1800	USA, WHRI Noblesville IN	7490na			
1700-1800	USA, WJCR Upton KY	9465eu			
1700-1800 smtwhf	USA, WMLK Bethel PA	7355am			
1700-1800	USA, WRNO New Orleans LA	11580af			
1700-1800 mtwhf	USA, WVHA Greenbush ME	9475am			
1700-1800	USA, WWCR Nashville TN	15695eu	12160am	13845am	15685am
1700-1800	USA, WYFR Okeechobee FL	15695eu	17555eu		
1700-1745	USA, WYFR Okeechobee FL	15695eu			
1700-1800	Zambia, Christian Voice	3330af	4965af		
1700-1800 vl	Zambia, R Zambia/ZNBC 1	4910do			
1700-1800 vl	Zambia, R Zambia/ZNBC 2	6165do			
1700-1800 vl	Zimbabwe, Zimbabwe BC	4828do			
1730-1800	Gum, AWR/KSDA	9370as			
1730-1800	Netherlands, Radio	6020af	9605af	11655af	
1730-1800 vl	Philippines, R Pilipinas	11815me	11890me	15190me	
1730-1800	Romania, R Romania Intl	11740af	11940af	15340af	
1730-1800	Swaziland, Trans World R	3200af			
1730-1800	Vatican State, Vatican R	9660af	11625af	15570af	
1745-1800	Bangladesh, Bangla Betar	7185as	9550as	15520as	
1745-1800	India, All India Radio	7410eu	9650eu	9950af	11620af
		11935af	13770as	13780do	15075me

1800-1900	Anguilla, Caribbean Beacon	11775am			
1800-1900	Australia, Radio	9580pa	9860pa	11880pa	12080pa
1800-1830	Australia, Radio	6060pa	6080as		
1800-1900 vl	Australia, VL8A Alice Spg	2310do			
1800-1900 vl	Australia, VL8K Katherine	2485do			
1800-1900 vl	Australia, VL8T Tent Crk	2325do			
1800-1900	Bangladesh, Bangla Betar	7185eu	9550as	15520do	
1800-1825 mtwhfs	Belgium, R Vlaanderen Int	5910eu	9925af		
1800-1900	Brazil, Radio Bras	15265eu			
1800-1900	Canada, CFCX Montreal	6005do			
1800-1900	Canada, CFRX Toronto	6070do			
1800-1900	Canada, CFVP Calgary	6030do			
1800-1900	Canada, CHNX Halifax	6130do			
1800-1900	Canada, CKZN St John's	6160do			
1800-1900	Canada, CKZU Vancouver	6160do			
1800-1900	Costa Rica, RF Peace Intl	15050am			
1800-1830	Egypt, Radio Cairo	15255af			
1800-1900	Eqt Guinea, Radio Africa	15186af			
1800-1900	India, All India Radio	7410eu	9650eu	9950af	11620af
		11935me	13770as	13780as	15075as
1800-1900 th	Ireland, W Coast R Ireland	11665af			
1800-1900 vl	Italy, IRRS	3985va			
1800-1900	Kuwait, Radio	11990na			
1800-1900 s	Morocco, RTVM Marocaine	17815af			
1800-1825	Netherlands, Radio	6020af	9605af	11655af	
1800-1815 mtwhf	New Zealand, R NZ Intl	6070pa			
1800-1900 vl	Papua New Guinea, NBC	4890do			
1800-1900 vl	Philippines, R Pilipinas	11815me	11890me	15190me	
1800-1900	Russia, Voice of Russia WS	4920eu	5940eu	6110eu	6130eu
		7180eu	7210af	7255af	7275af
		7305af	7325af	7440eu	9505af
		9550eu	9585af	9890eu	
		9675af	17735af		
1800-1825	S Africa, Investment Ch	9200af			
1800-1900	Sudan, Radio Omdurman	3200af			
1800-1900	Swaziland, Trans World R	9500af			
1800-1830	Swaziland, Trans World R	3255af	3955eu	6005eu	6180eu
1800-1900	United Kingdom, BBC WS	6190af	6195eu	9410va	9740as
		12095eu	15400af	15420af	15485va
		17830af	17840na		
1800-1830	United Kingdom, BBC WS	5975as	6090va	9510as	
1800-1900	USA, KAIJ Dallas TX	13815am			
1800-1900	USA, KJES Mesquite NM	15385na			
1800-1900	USA, KTNB Salt Lk City UT	15590am			
1800-1900	USA, KWHR Naalehu HI	13625au			
1800-1900	USA, Monitor Radio Intl	9355eu	9385af	13770eu	18930af
1800-1900	USA, Voice of America	6040va	9760me	11920af	11975af
		12040af	13710af	15410af	15580af
1800-1900	USA, WEWN Birmingham AL	11875na	13615na	17695eu	
1800-1900	USA, WGTG McCaysville GA	9400am			
1800-1900	USA, WHRI Noblesville IN	9495am	13760eu		
1800-1900	USA, WJCR Upton KY	7490na			
1800-1500 smtwhf	USA, WMLK Bethel PA	9465eu			
1800-1900	USA, WRNO New Orleans LA	7355am			
1800-1900 smtwhf	USA, WVHA Greenbush ME	9930af			
1800-1900	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1800-1845	USA, WYFR Okeechobee FL	17555eu			
1800-1830	Vietnam, Voice of	7400eu	9840eu		
1800-1900	Yemen, Yemeni Rep Radio	9780do			
1800-1900	Zambia, Christian Voice	3330af	4965af		
1800-1900 vl	Zambia, R Zambia/ZNBC 1	4910do			
1800-1900 vl	Zambia, R Zambia/ZNBC 2	6165do			
1800-1900 vl	Zimbabwe, Zimbabwe BC	4828do			
1825-1900 vl	Cyprus, Radio Bayrak	6159eu			
1830-1900	Albania, R Tirana Intl	6270eu	7270eu	9740eu	
1830-1900	Australia, Radio	7240pa	7330as		
1830-1900 t	Belarus, Radiosta Belarus	6010eu	7105eu	7205eu	7210eu
1830-1900	Mongolia, Voice of	9745eu	12085eu		
1830-1900	Netherlands, Radio	6020af	9605af	11655af	15315af
		17605af			
1830-1855	S Africa, Investment Ch	9675af	17735af		
1830-1900 w	Saipan, FEBC/KFBS	9465va			
1830-1900 a	Serbia, Radio Yugoslavia	6100eu	9720af		
1830-1900	Slovakia, R Slovakia Intl	5915eu	6055eu	7345eu	
1830-1835	Somalia, Radio Mogadishu	6732do			
1830-1900	Turkey, Voice of	6000na	6035na		
1830-1900	United Kingdom, BBC WS	9630af			
1833-1900	Cote D'ivoire, RDTV	11920do			
1840-1850	Greece, Voice of	11645af			
1845-1900 mtwhf	Armenia, Voice of	4810me	4990eu	7480me	
1845-1900 irreg s	Mali, RDTV Malienne	4783do	4835do	5995do	
1850-1900	Vatican State, Vatican R	4005eu	5880eu	7250eu	
1852-1900	New Zealand, R NZ Intl	9795pa			
1858-1900 s	Germany, R Alpha & Omega	6110eu			

HAUSER'S HIGHLIGHTS FRANCE: R France Int'l

In addition to SW cuts for Europe, RFI announced it would soon stop using 11615 in English to NAm at 1200-1300, and 5945 in French at 2200-0300 (BBCM)

FREQUENCIES

1900-2000	Anguilla, Caribbean Beacon	11775am				2000-2100	Angola, Radio Nacional	3355do	9535do		
1900-2000 m-f/vl	Argentina, RAE	15345eu				2000-2100	Anguilla, Caribbean Beacon	11775am			
1900-2000	Australia, Radio	6080pa	7240pa	7330as	9580pa	2000-2100	Australia, Radio	6080pa	7240pa	7330as	9580pa
		9860pa	11880pa	12080pa				9860pa	11880pa	12080pa	
1900-2000 vl	Australia, VL8A Alice Spg	2310do				2000-2100 vl	Australia, VL8A Alice Spg	2310do			
1900-2000 vl	Australia, VL8K Katherine	2485do				2000-2100 vl	Australia, VL8K Katherine	2485do			
1900-2000 vl	Australia, VL8T Tent Crk	2325do				2000-2100 vl	Australia, VL8T Tent Crk	2325do			
1900-1920	Brazil, Radio Bras	15265eu				2000-2100	Canada, CFCX Montreal	6005do			
1900-2000	Bulgaria, Radio	7335eu	9700eu			2000-2100	Canada, CFCX Toronto	6070do			
1900-2000	Canada, CFCX Montreal	6005do				2000-2100	Canada, CFCX Toronto	6070do			
1900-2000	Canada, CFCX Toronto	6070do				2000-2100	Canada, CFCX Calgary	6030do			
1900-2000	Canada, CFCX Montreal	6030do				2000-2100	Canada, CHNX Halifax	6130do			
1900-2000	Canada, CHNX Halifax	6130do				2000-2100	Canada, CKZN St John's	6160do			
1900-2000	Canada, CKZN St John's	6160do				2000-2100	Canada, CKZU Vancouver	6160do			
1900-2000	Canada, CKZU Vancouver	6160do				2000-2100	China, China Radio Intl	5220eu	6950eu	9440af	9920eu
1900-2000	China, China Radio Intl	6955af	9440af			2000-2100	Costa Rica, RF Peace Intl	11715af	15110af		
1900-2000	Costa Rica, Adv World R	13750am	15460am			2000-2100	Cyprus, Radio Bayrak	15050am			
1900-2000	Costa Rica, RF Peace Intl	15050am				2000-2100 vl	Ecuador, HCJB	6159eu			
1900-1930	Cote D'Ivoire, RDTV	11920do				2000-2100	Egypt, HCJB	11960eu	21455am		
1900-2000 vl	Cyprus, Radio Bayrak	6159eu				2000-2100	Eqt Guinea, Radio Africa	15186af			
1900-1927	Czech Rep, Radio Prague	5930eu	7345af			2000-2050	Germany, Deutsche Welle	5960eu	7285eu	9615eu	9670pa
1900-2000	Ecuador, HCJB	11960eu	21455am			2000-2030	Ghana, Ghana Broadc Corp	3365do	4915do		
1900-2000	Eqt Guinea, Radio Africa	15186af				2000-2010	Greece, Voice of	9375eu			
1900-1930 m	Estonia, Radio	5925eu				2000-2100	Guatemala, Adv World R	5980am			
1900-1950	Germany, Deutsche Welle	9640af	9765af	11785af	11810af	2000-2100	Indonesia, Voice of	9525as			
		13690af	15135af	15425af		2000-2100	Iran, VOIRI	7260af	9022eu		
1900-2000 s	Germany, R Alpha & Omega	6110eu				2000-2100 vl	Italy, IRRS	3955va			
1900-2000	Guatemala, Adv World R	5980am				2000-2100 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do	
1900-1930	Hungary, Radio Budapest	3975eu	5970eu	9835eu		2000-2100	Kuwait, Radio	11990eu			
1900-1945	India, All India Radio	7410eu	9650eu	9950me	11620eu	2000-2030	Mexico, Radio Mexico Intl	9705na			
		11935af	13770as	13780as	15075as	2000-2025	Netherlands, Radio	6020af	9605af	11655af	15315af
		7465na	9365eu	9435na	15640af			17605af			
1900-1925	Israel, Kol Israel	3985va				2000-2100 fa	New Zealand, R NZ Intl	11735pa			
1900-2000 vl	Italy, IRRS	3955va				2000-2100 smtwh	New Zealand, R NZ Intl	11735pa			
1900-2000	Japan, R Japan/NHK World	6035as	7140pa	7200as	9535na	2000-2005	Nigeria, FRCN/Radio	3326do	4770do	4990do	
1900-2000 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do		2000-2050	North Korea, R Pyongyang	6575eu	9345as	9640af	9975as
1900-2000	Kuwait, Radio	11990eu				2000-2100 vl	Papua New Guinea, NBC	4890do			
1900-1930 as	Latvia, Radio	5935eu				2000-2025	Poland, Polish R Warsaw	6035eu	6095eu	7285eu	
1900-1915	Liberia, LCN/R Liberia Int	5100do				2000-2100	Russia Voice of Russia WS	5940eu	6110eu	7170eu	7180eu
1900-2000 smtwha	Malta, VO Mediterranean	7390va	7440va			2000-2015	S Africa, Investment Ch	7270af	15420af	17890af	
1900-1930	Mexico, Radio Mexico Intl	9705na				2000-2015	Sierra Leone, SLBS	3316do			
1900-2000	Netherlands, Radio	6020af	9605af	11655af	15315af	2000-2100	Slovakia, Adv World Radio	6055eu			
		17605af				2000-2015 irreg	Somalia, Radio Mogadishu	6870af			
1900-1951 smtwh	New Zealand, R NZ Intl	9795pa				2000-2100 mtwhf	Spain, R Exterior Espana	6125eu	11775af		
1900-1958 fa	New Zealand, R NZ Intl	9795pa				2000-2045	Swaziland, Trans World R	3200af			
1900-1930 s	Norway, Radio Norway Intl	5960eu	7485af	9590af		2000-2030	Switzerland, Swiss R Intl	9885af	9905af	11640af	13635af
1900-2000 vl	Papua New Guinea, NBC	4890do				2000-2015	Uganda, Radio	4976do			
1900-1930 vl	Philippines, R Pilipinas	11815me	11890me	15190me		2000-2100	United Kingdom, BBC WS	3255af	3955eu	6005af	6180eu
1900-2000	Romania, R Romania Intl	5955eu	7105af	7195eu	9690eu			6190af	6195eu	7150va	7325va
1900-2000	Russia, Voice of Russia WS	4920eu	5940eu	6110eu	6130eu			9410af	9630af	9740as	11750am
		7175af	7180eu	7305af	7325af			11835af	11955as	12095eu	15400af
		9585af	9795eu	9890eu	13670af			17830af			
1900-1925	S Africa, Investment Ch	9675af	15420af	17890af		2000-2100	USA, KAIJ Dallas TX	13815am			
1900-2000	South Korea, R Korea Intl	5975eu	7275as			2000-2100	USA, KTN Salt Lk City UT	15590am			
1900-2000	Swaziland, Trans World R	3200af				2000-2100	USA, KWHR Naalehu HI	11815as			
1900-1920	Switzerland, Swiss R Intl	6165eu				2000-2100	USA, Monitor Radio Intl	9355eu	11550eu	11860pa	
1900-2000	Thailand, Radio	7295eu	9655eu	11905eu		2000-2100	USA, Voice of America	6035af	7415af	9760me	11855af
1900-1930	Turkey, Voice of	6000na	6035na					11975af	13710af	15205me	15410af
1900-2000	United Kingdom, BBC WS	3255af	3955eu	6005af	6180eu			15580af	17725af	17755af	
		6190af	6195va	9410af	9630af			7425na	13615na	17695eu	
		9740as	12095eu	15400af	15485va						
		17830af									
1900-1915	United Kingdom, BBC WS	11835af	15105af			2000-2100	USA, WENW Birmingham AL	9400am			
1900-2000	USA, KAIJ Dallas TX	13815am				2000-2100	USA, WGTG McCaysville GA	9495am	13760am		
1900-2000	USA, KTN Salt Lk City UT	15590am				2000-2100	USA, WHRI Noblesville IN	7490na			
1900-2000	USA, KWHR Naalehu HI	13625au				2000-2100	USA, WJCR Upton KY	9465eu			
1900-2000	USA, Monitor Radio Intl	9355eu	9385af	13770eu	17510af	2000-2100 smtwhf	USA, WMLK Bethel PA	9955am			
1900-2000	USA, Voice of America	4950af	6035af	7415af	9525pa	2000-2030 as	USA, WRNO New Orleans LA	7355am			
		9760me	11870pa	11975va		2000-2100	USA, WRNO New Orleans LA	7355am			
		12040af	13710af	15180pa	15410af	2000-2100 mtwha	USA, WVHA Greenbush ME	9930va			
		15580af				2000-2100	USA, WVHA Greenbush ME	7435am	9475am	12160am	13845am
1900-2000	USA, WENW Birmingham AL	7425na	13615na	17695eu		2000-2100	USA, WYFR Okeechobee FL	7355eu	11580eu	15566eu	
1900-2000	USA, WGTG McCaysville GA	9400am				2000-2100	Zambia, Christian Voice	3330af	4965af		
1900-2000	USA, WHRI Noblesville IN	9495am				2000-2100 vl	Zambia, R Zambia/ZNBC 2	6165do			
1900-2000	USA, WJCR Upton KY	7490na				2000-2100 vl	Zimbabwe, Zimbabwe BC	4828do			
1900-2000 smtwhf	USA, WMLK Bethel PA	9465eu				2005-2010	Syria, Radio Damascus	12085na	13610eu		
1900-2000 s	USA, WRNO New Orleans LA	9955am				2025-2045	Italy, RAI Intl	7105af	9685af	11840af	
1900-2000	USA, WRNO New Orleans LA	7355am				2025-2035 mtwhf	Latvia, Radio	5935eu			
1900-2000 mtwha	USA, WVHA Greenbush ME	9930va				2030-2100	Egypt, Radio Cairo	15375af			
1900-2000	USA, WYFR Okeechobee FL	7355eu				2030-2055	S Africa, Investment Ch	7270af	17890af		
1900-1945	USA, WYFR Okeechobee FL	21525af				2030-2100	Slovakia, Adv World Radio	9455af			
1900-1930	Vatican State, Vatican R	7365eu	9645eu			2030-2100	Sweden, Radio	6065eu			
1900-1930	Vietnam, Voice of	7400eu	9840eu			2030-2045	Thailand, Radio	9655eu	11805as	11905eu	
1900-2000	Zambia, Christian Voice	3330af	4965af			2030-2100 as	USA, Voice of America	4950eu			
1900-2000 vl	Zambia, R Zambia/ZNBC 1	4910do				2030-2100 irreg	USA, WINB Red Lion PA	11740am			
1900-2000 vl	Zambia, R Zambia/ZNBC 2	6165do				2030-2100	Uzbekistan, R Tashkent	4850eu	5995eu	7105eu	9540eu
1900-2000 vl	Zimbabwe, Zimbabwe BC	4828do						11905eu			
1930-1955	Austria, R Austria Intl	5945eu	6155eu	9495af		2045-2100	India, All India Radio	7150eu	9910au	9950eu	
1930-2000	Iran, VOIRI	7260af						11620eu	11715pa		
1930-2000	Poland, Polish R Warsaw	6035eu	6095eu	7285eu							
1930-1955	S Africa, Investment Ch	9675af	15420af	17890af							
1930-2000	South Korea, R Korea Intl	3970eu									
1930-2000	Sweden, Radio	6065eu	7240eu	9655af							
1935-1955	Italy, RAI Intl	6030eu	7235eu								
1950-2000 irreg	USA, WINB Red Lion PA	11740am									
1952-2000 smtwh	New Zealand, R NZ Intl	11735pa									
1959-2000 fa	New Zealand, R NZ Intl	11735pa									

FREQUENCIES

2100-2200	Anguilla, Caribbean Beacon	11775am			
2100-2200	Australia, Radio	7240pa	9660pa	9850pa	9860as
		11640as	11695pa	11855as	11880pa
		12080pa	13605pa		
2100-2130	Australia, Radio	6080pa	11800pa		
2100-2130 vl	Australia, VL8A Alice Spg	2310do			
2100-2130 vl	Australia, VL8K Katherine	2485do			
2100-2200 vl	Australia, VL8K Katherine	5025do			
2100-2130 vl	Australia, VL8T Tent Crk	2325do			
2100-2200 vl	Australia, VL8T Tent Crk	4910do			
2100-2125	Belgium, R Vlaanderen Int	5910eu			
2100-2300	Bulgaria, Radio	7390eu	9700eu		
2100-2200 vl	Cameroon, Radio Garoua	5010do			
2100-2200 vl	Canada, CBC N Quebec Svc	9625do			
2100-2200	Canada, CFCX Montreal	6005do			
2100-2200	Canada, CFRX Toronto	6070do			
2100-2200	Canada, CFVP Calgary	6030do			
2100-2200	Canada, CHNX Halifax	6130do			
2100-2200	Canada, CKZN St John's	6160do			
2100-2200	Canada, CKZU Vancouver	6160do			
2100-2200	Canada, R Canada Intl	5925eu	5995eu	7235eu	9805af
		11945af	13650af	13690af	15150af
		17820af			
2100-2200	China, China Radio Intl	5220eu	6950eu	9920af	
2100-2130	China, China Radio Intl	11715af	15110af		
2100-2130	China, China Radio Intl	3985eu			
2100-2200	Costa Rica, RF Peace Intl	15050am			
2100-2200	Cuba, Radio Havana	9585eu	9620eu		
2100-2200 vl	Cyprus, Radio Bayrak	6159eu			
2100-2200	Ecuador, HCJB	11960eu	21455am		
2100-2200	Egypt, Radio Cairo	15375af			
2100-2200	Eqt Guinea, Radio Africa	15186af			
2100-2150	Germany, Deutsche Welle	9615af	9670as	9765as	11785pa
		11865af	15275af		
2100-2130	Hungary, Radio Budapest	3975eu	5970eu	7250eu	9835eu
2100-2200	India, All India Radio	7150eu	7410eu	9910eu	9950eu
		11620au	11715au		
2100-2200 vl	Italy, IRRS	3955va			
2100-2200	Japan, R Japan/NHK World	6035as	9560as	9825as	11850pa
2100-2110	Japan, R Japan/NHK World	9860as	11685as		
2100-2107 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do	
2100-2200	Lebanon, Voice of Hope	9960va			
2100-2115	Liberia, LCN/R Liberia Int	5100do			
2100-2125 mtwhf	Moldova, R Moldova Intl	7520eu			
2100-2200 smtwh	New Zealand, R NZ Intl	11735pa			
2100-2200	Nigeria, FRCN/Radio	3326do	4770do	4990do	
2100-2200 vl	Papua New Guinea, NBC	4890do			
2100-2130 mtwhf	Portugal, R Portugal Intl	6130eu	9780eu	9815eu	
2100-2200	Romania, R Romania Intl	5955eu	5990eu	7105eu	7195eu
2100-2200	Russia, Voice of Russia WS	5940eu	6110eu	7180eu	7205eu
		7320eu	7360eu	7400eu	9890eu
2100-2125	S Africa, Investment Ch	15420af			
2100-2130	Serbia, Radio Yugoslavia	6100eu	6185eu		
2100-2200	South Korea, R Korea Intl	6480eu	15575eu		
2100-2110	Uganda, Radio	4976do			
2100-2200	Ukraine, R Ukraine Intl	5905eu	6010eu	6020eu	6080eu
		7115eu	7160eu	7205eu	7290eu
		7380eu			
2100-2200	United Kingdom, BBC WS	3255af	3915as	3955eu	5965as
		5975am	6005af	6120as	6180eu
		6190af	6195va	7150va	7325eu
		9410va	9740as	11680va	11750sa
		11835af	11955as	12095va	
2100-2130	United Kingdom, BBC WS	9630af			
2100-2200	USA, KAIJ Dallas TX	13815am			
2100-2200	USA, KTNB Salt Lk City UT	15590am			
2100-2200	USA, KWHR Naalehu HI	11815as			
2100-2200	USA, Monitor Radio Intl	9355am	11550eu	13840au	
2100-2200	USA, Voice of America	6035af	6070me	7415af	9595me
		9760me	11975af	13710eu	15205me
		15410eu	15580eu	17725eu	
2100-2200	USA, WEWN Birmingham AL	6890eu	7395na	13615na	
2100-2200	USA, WGTG McCaysville GA	9400am			
2100-2200	USA, WHRI Noblesville IN	9495am			
2100-2200	USA, WJCR Upton KY	7490na			
2100-2200 a	USA, WRMI/R Miami Intl	9955am			
2100-2200	USA, WRNO New Orleans LA	7355am			
2100-2200 smtwhf	USA, WVHA Greenbush ME	5850af			
2100-2200	USA, WWCR Nashville TN	5070am	7435am	9475am	13845am
2100-2145	USA, WYFR Okeechobee FL	11580af	15566af	21525eu	
2100-2200	Zambia, Christian Voice	3330af	4965af		
2100-2200 vl	Zambia, R Zambia/ZNBC 1	4910do			
2100-2200 vl	Zambia, R Zambia/ZNBC 2	6165do			
2100-2200 vl	Zimbabwe, Zimbabwe BC	4828do			
2115-2200	Egypt, Radio Cairo	9900eu			
2115-2130	United Kingdom, BBC WS	11680am	15390am	17715am	

2130-2200	Armenia, Voice of	7480eu	9965eu	11615eu	
2130-2200	Australia, Radio	13755pa	17795pa	17860pa	
2130-2157	Czech Rep, Radio Prague	5930na	7345na		
2130-2200	Finland, YLE/R Finland	6135eu			
2130-2200	Ghana, Ghana Broadc Corp	3366do			
2130-2200	Guam, AWR/KSDA	15310as			
2130-2200	Iran, VOIRI	9720au			
2130-2155	S Africa, Investment Ch	15420af	17890af		
2130-2200 as	Sweden, Radio	6065eu	7230af		
2130-2200	Uzbekistan, R Tashkent	4850eu	5995eu	7105eu	9540eu
		11905eu			
2145-2200 a	Greece, Voice of	9425au			

2200 UTC

2200-2300	Anguilla, Caribbean Beacon	6090am			
2200-2300	Australia, Radio	11695pa	11855as	12080pa	13755pa
		15365pa	17795pa	17860pa	
2200-2300 vl	Australia, VL8K Katherine	5025do			
2200-2300 vl	Australia, VL8T Tent Crk	4910do			
2200-2300	Canada, CBC N Quebec Svc	9625do			
2200-2300	Canada, CFCX Montreal	6005do			
2200-2300	Canada, CFRX Toronto	6070do			
2200-2300	Canada, CFVP Calgary	6030do			
2200-2300	Canada, CHNX Halifax	6130do			
2200-2300	Canada, CKZN St John's	6160do			
2200-2300	Canada, CKZU Vancouver	6160do			
2200-2230	Canada, R Canada Intl	5995eu	7235eu	9805af	11705eu
		11945af	13690eu	15150eu	
		7110eu	7170eu		
2200-2300	China, China Radio Intl	7385am	15050am		
2200-2300	Costa Rica, RF Peace Intl	6180na			
2200-2300	Cuba, Radio Havana	5930na	7345na		
2200-2227	Czech Rep, Radio Prague	9900eu			
2200-2245	Egypt, Radio Cairo	15186af			
2200-2300	Eqt Guinea, Radio Africa	4915do			
2200-2215	Ghana, Ghana Broadc Corp	7150eu	7410eu	9910eu	9950eu
2200-2230	India, All India Radio	11620au	11715au		
2200-2230	Iran, VOIRI	6175au			
2200-2225	Italy, RAI Intl	6150as	9565as	11815pa	
2200-2300	Lebanon, Voice of Hope	9960va			
2200-2215	Liberia, LCN/R Liberia Int	5100do			
2200-2300	Malaysia, Radio	7295do			
2200-2225 mtwhf	Moldova, R Moldova Intl	7520na			
2200-2300 smtwh	New Zealand, R NZ Intl	11735pa			
2200-2215	Nigeria, FRCN/Radio	3326do	4770do	4990do	
2200-2208 vl	Papua New Guinea, NBC	4890do			
2200-2300	Russia, Voice of Russia WS	5940na	7105na	7125na	7170na
		7180na	7330na		
2200-2215	Sierra Leone, SLBS	3316do			
2200-2300	Slovakia, Adv World Radio	6055af			
2200-2300 as	Spain, R Exterior Espana	6125eu	11775af		
2200-2205	Syria, Radio Damascus	12085na	13610eu		
2200-2300	Taiwan, VO Free China	5810eu	9985eu		
2200-2300	Turkey, Voice of	6135na	7280na	9560na	9655na
2200-2300	United Kingdom, BBC WS	3955eu	5905as	5975am	6175am
		6180va	6195as	7110as	7150as
		7325va	9410va	9590am	9660as
		9915am	11750am	11835af	11955as
		12080as			
2200-2300	USA, KAIJ Dallas TX	13815am			
2200-2300	USA, KTNB Salt Lk City UT	15590am			
2200-2300	USA, Monitor Radio Intl	7510eu	13770sa	15665as	
2200-2300	USA, Voice of America	7215as	9770as	9890as	11760as
		15185as	15290as	15305as	17735as
		17820as			
2200-2230 mtwhf	USA, Voice of America	6035af	7415af	11975af	12080af
		13710af			
2200-2300	USA, WEWN Birmingham AL	6890na	13615na		
2200-2300	USA, WGTG McCaysville GA	5085am			
2200-2300	USA, WHRI Noblesville IN	5745am			
2200-2300	USA, WJCR Upton KY	7490na			
2200-2300 a	USA, WRMI/R Miami Intl	9955am			
2200-2300	USA, WRNO New Orleans LA	7355am			
2200-2300 s	USA, WVHA Greenbush ME	5850eu			
2200-2300	USA, WWCR Nashville TN	3215am	5070am	7435am	13845am
2200-2245	USA, WYFR Okeechobee FL	6085na	11855ca		
2200-2300 vl	Zambia, R Zambia/ZNBC 1	4910do			
2203-2210	Croatia, Croatian Radio	5895eu	7165eu	13830eu	
2210-2300 vl	Papua New Guinea, NBC	9675do			
2230-2255	Austria, R Austria Intl	5945eu	6155eu	9495af	
2230-2300	Sweden, Radio	6065eu	7325af		
2240-2250	Greece, Voice of	9425au			
2245-2300	Ghana, Ghana Broadc Corp	3366do	4915do		
2245-2300	India, All India Radio	7170as	9705as	9950as	11620as
2245-2300	Vatican State, Vatican R	6065as	7305as	9600as	11830au

FREQUENCIES

2300-0000	Anguilla, Caribbean Beacon	6090am				2300-0000	United Kingdom, BBC WS	5965as	5975am	6175am	6195am
2300-0000	Australia, Radio	9660pa	11695as	11855as	13755as			7110as	7180as	9580as	9590na
	15365pa	17795pa	17860pa					9915am	11750sa	11945as	11955as
2300-0000 vl	Australia, VL8K Katherine	5025do				2300-2330 a	United Kingdom, BBC WS	11835af			
2300-0000 vl	Australia, VL8T Tent Crk	4910do				2300-2345	United Kingdom, BBC WS	3915va			
2300-0000	Bulgaria, Radio	7375na	9485na			2300-2315	United Kingdom, BBC WS	11835af			
2300-0000	Canada, CBC N Quebec Svc	9625do				2300-0000	USA, KAIJ Dallas TX	5810am			
2300-0000	Canada, CFCX Montreal	6005do				2300-0000	USA, KTBN Salt Lk City UT	15590am			
2300-0000	Canada, CFRX Toronto	6070do				2300-0000	USA, KWHR Naalehu HI	17510as			
2300-0000	Canada, CFVP Calgary	6030do				2300-0000	USA, Monitor Radio Intl	7510af	13770sa		
2300-0000	Canada, CHNX Halifax	6130do				2300-0000	USA, Voice of America	7215as	9770as	9890as	11760as
2300-0000	Canada, CKZN St John's	6160do						15185as	15290as	15305as	17735as
2300-0000	Canada, CKZU Vancouver	6160do						17820as			
2300-2330	Canada, R Canada Intl	5960am	6040am	9535am	9755am	2300-0000	USA, WEWN Birmingham AL	5825eu	6890na	7425na	
		11940am				2300-0000	USA, WGTG McCaysville GA	5085am			
2300-0000	Costa Rica, Adv World R	5030am	6150am	7375am	9725am	2300-0000	USA, WHRI Noblesville IN	5745am	7315am		
		13750am	15460am			2300-0000 irreg	USA, WINB Red Lion PA	11950am			
2300-0000	Costa Rica, RF Peace Intl	7385am	15050am			2300-0000	USA, WJCR Upton KY	7490na			
2300-2310	Croatia, Croatian Radio	5895eu	7165eu			2300-0000 a	USA, WRMI/R Miami Intl	9955am			
2300-0000	Egypt, Radio Cairo	9900na				2300-0000	USA, WRNO New Orleans LA	7355am			
2300-2350	Germany, Deutsche Welle	6000as	6160as	7235as		2300-0000 mtwhf	USA, WVHA Greenbush ME	9900af			
2300-0000	Guam, AWR/KSDA	11895as				2300-0000	USA, WWCR Nashville TN	3215am	5070am	5935am	
2300-0000	Guatemala, Adv World R	11775am				2300-2315	Vatican State, Vatican R	7305as	9600as	11830na	
2300-0000	India, All India Radio	7170as	9705as	9950as	11620as	2307-0000	New Zealand, R NZ Intl	15115pa			
2300-0000	Japan, R Japan/NHK World	6180eu	9560as	9825eu	11850pa	2330-2355	Belgium, R Vlaanderen Int	5900na	9925sa		
2300-0000	Lebanon, Voice of Hope	9960va				2330-0000 as	Canada, R Canada Intl	5960am	6010am	9535am	9755am
2300-2315	Liberia, LCN/R Liberia Int	5100do						11940am			
2300-0000	Malaysia, Radio	7295do				2330-0000	Canada, R Canada Intl	5960na	9755na		
2300-2306 smtwh	New Zealand, R NZ Intl	11735pa				2330-0000 vl	Ghana, Ghana Broadc Corp	4915af			
2300-2315	Nigeria, FRCN/Radio	3326do	4770do	4990do		2330-0000	Iraq, Radio Iraq Intl	6050eu	11890eu		
2300-2325	North Korea, R Pyongyang	11700na	13650na			2330-0000	Lithuania, Radio Vilnius	5890na	6120na		
2300-2330 s	Norway, Radio Norway Intl	5905sa	7275as	7465na		2330-2359	Netherlands, Radio	6020na	6165na		
2300-0000 vl	Papua New Guinea, NBC	9675do				2330-0000	Vietnam, Voice of	5940as	7270as	7400as	9840as
2300-0000	Romania, R Romania Intl	7175na	9510na	9570na	11940na			12020as	15010as		
2300-0000	Russia, Voice of Russia WS	5940na	7105eu	7125na	7180na	2335-2345	Greece, Voice of	7450sa	9935sa	11640sa	
2300-0000	Ukraine, R Ukraine Intl	5905eu	5940eu	6010eu	6020eu	2355-0000	Japan, R Japan/NHK World	9860as	11685au		
		7205eu	7290eu								

SELECTED PROGRAMS

Sundays

- 2300 Bulgaria, Radio: News. See S 0400.
 2300 Japan, NHK/Radio: News. See S 0300.
 2300 USA, KTBN Salt Lk City UT: E.V. Hill, Pastor Hill preaches.
 2300 USA, WRMI/R Miami Intl, FL: Brother Ted's Ministry. See S 1615.
 2310 Japan, NHK/Radio: Let's Learn Japanese. A course in the Japanese language.
 2315 Bulgaria, Radio: Timeout for Music. A wide variety of Bulgarian classical, pop and folk music is played.
 2325 Japan, NHK/Radio: Media Roundup. Reception reports, DX/media news, and equipment reviews.
 2330 Bulgaria, Radio: Radio Bulgaria Spectrum. Thirty-minute digest on a wide variety of topics.
 2330 USA, KTBN Salt Lk City UT: The Living Way. Jack Hayford preaches from The Church on the Way in Los Angeles.
 2350 Japan, NHK/Radio: Viewpoint. Opinions of a guest personality.
 2355 Japan, NHK/Radio: Tokyo Pop-In. A sample of the Japanese music scene.

Mondays

- 2300 Bulgaria, Radio: News. See S 0400.
 2300 Japan, NHK/Radio: News. See S 0300.
 2300 USA, KTBN Salt Lk City UT: Let's Have Church. Mike Purkey conducts the services.
 2300 USA, WGTG McCaysville GA: The Baker Report. Jeff Baker.
 2300 USA, WRMI/R Miami Intl, FL: Freedom Now (live). Irwin Schiff, broadcasting from Las Vegas, discusses tax issues and takes listener phone calls.
 2300 Vatican State, Vatican Radio: Ask the Abbot. The abbot answers questions about the Catholic faith.
 2311 Japan, NHK/Radio: Asian Top News. See M 1511.
 2315 Bulgaria, Radio: Program Announcements. What's coming up this week on Radio Bulgaria.
 2317 Bulgaria, Radio: Events and Development. A review of upcoming events this week.
 2321 Japan, NHK/Radio: Profile. See M 1521.
 2330 Bulgaria, Radio: Business and Finance. Economic news briefs and financial developments in Bulgaria.
 2330 USA, KTBN Salt Lk City UT: Get Ready. Bishop Jakes preaches from Crenshaw Christian Center in Los Angeles.
 2351 Japan, NHK/Radio: Tokyo Pop-In. See S 2355.
 2355 Japan, NHK/Radio: News. See S 0300.

Tuesdays

- 2300 Bulgaria, Radio: News. See S 0400.

- 2300 Japan, NHK/Radio: News. See S 0300.
 2300 USA, KTBN Salt Lk City UT: Charisma Now. A magazine program from Charisma Magazine.
 2300 USA, WGTG McCaysville GA: The Baker Report. See M 2300.
 2300 USA, WRMI/R Miami Intl, FL: Freedom Now (live). See M 2300.
 2300 Vatican State, Vatican Radio: What Can I Do? A practical guide for the practicing Catholic.
 2311 Japan, NHK/Radio: Asian Top News. See M 1511.
 2315 Bulgaria, Radio: Events and Development. See M 2317.
 2330 Bulgaria, Radio: Answering Your Letters. Replies to listener letters and Bulgarian music.
 2330 USA, KTBN Salt Lk City UT: Origins. An examination of biblical manuscripts and their translations.
 2349 Bulgaria, Radio: Sports Roundup. A review of seasonal sporting events and scores.
 2351 Japan, NHK/Radio: Tokyo Pop-In. See S 2355.
 2355 Japan, NHK/Radio: News Summary. See S 0355.

Wednesdays

- 2300 Bulgaria, Radio: News. See S 0400.
 2300 Japan, NHK/Radio: News. See S 0300.
 2300 USA, WGTG McCaysville GA: The Baker Report. See M 2300.
 2300 USA, WRMI/R Miami Intl, FL: Freedom Now (live). See M 2300.
 2311 Japan, NHK/Radio: Asian Top News. See M 1511.
 2315 Bulgaria, Radio: Events and Development. See M 2317.
 2321 Japan, NHK/Radio: Town and Around. See W 1521.
 2330 Bulgaria, Radio: Weekly Cultural Review. See W 1100.
 2351 Japan, NHK/Radio: Tokyo Pop-In. See S 2355.
 2355 Japan, NHK/Radio: News Summary. See S 0355.

Thursdays

- 2300 Bulgaria, Radio: News. See S 0400.
 2300 Japan, NHK/Radio: News. See S 0300.
 2300 USA, KTBN Salt Lk City UT: Jerry Barnard. Services from the Cathedral of Faith in San Jose, CA.
 2300 USA, WGTG McCaysville GA: The Baker Report. See M 2300.
 2300 USA, WRMI/R Miami Intl, FL: Freedom Now (live). See M 2300.
 2300 Vatican State, Vatican Radio: Ask the Abbot. See M 2300.
 2311 Japan, NHK/Radio: Asian Top News. See M 1511.
 2315 Bulgaria, Radio: Events and Development. See M 2317.
 2330 Bulgaria, Radio: Lifestyle. A look at everyday life in Bulgaria.
 2330 USA, KTBN Salt Lk City UT: This Week in Bible Prophecy. See T 0600.

- 2351 Japan, NHK/Radio: Tokyo Pop-In. See S 2355.
 2355 Japan, NHK/Radio: News Summary. See S 0355.

Fridays

- 2300 Bulgaria, Radio: News. See S 0400.
 2300 Japan, NHK/Radio: News. See S 0300.
 2300 USA, WGTG McCaysville GA: The Baker Report. See M 2300.
 2300 USA, WRMI/R Miami Intl, FL: Freedom Now (live). See M 2300.
 2301 Vatican State, Vatican Radio: What Can I Do? See T 2300.
 2315 Bulgaria, Radio: Program Announcements. See M 2315.
 2315 Japan, NHK/Radio: Asian Top News. See M 1511.
 2317 Bulgaria, Radio: Events and Development. See M 2317.
 2321 Japan, NHK/Radio: Music and Book Beat. See F 1521.
 2330 Bulgaria, Radio: Straight from the Horse's Mouth. See M 0430.
 2345 Bulgaria, Radio: Radio Bulgaria Calling. See M 0445.
 2351 Japan, NHK/Radio: Tokyo Pop-In. See S 2355.
 2355 Japan, NHK/Radio: News Summary. See S 0355.

Saturdays

- 2300 Bulgaria, Radio: News. See S 0400.
 2300 Japan, NHK/Radio: News. See S 0300.
 2300 USA, KTBN Salt Lk City UT: The Coral Ridge Hour. See S 1500.
 2300 USA, WRMI/R Miami Intl, FL: Radio Modern Rock (1/3). A half-hour of hard rock music.
 2300 USA, WRMI/R Miami Intl, FL: Viva Miami! (2/4/5). See M 1430.
 2300 Vatican State, Vatican Radio: On-the-Air. See S 0258.
 2310 Japan, NHK/Radio: Asia Weekly. See A 1510.
 2311 Japan, NHK/Radio: Asian News Summary. This ten-minute wrap-up of regional events is heard as a segment of the program Asia Weekly.
 2315 Bulgaria, Radio: Rocking Chair. A look at Bulgarian rock, pop, jazz, youth subculture, favorite hangouts, and entertainment.
 2321 Japan, NHK/Radio: Business Report. A summary of regional financial news heard as part of the program Asia Weekly.
 2325 Japan, NHK/Radio: Entertaining in Asia. A segment of "Asian Report" which focuses on an aspect of entertainment in the region.
 2330 Bulgaria, Radio: Listeners Club. A program for members of the Bulgarian Listeners Club.
 2330 USA, WRMI/R Miami Intl, FL: Viva Miami! See M 1430.
 2346 Japan, NHK/Radio: Asia Kaleidoscope. See A 1514.
 2355 Japan, NHK/Radio: Tokyo Pop-In. See S 2355.

PROPAGATION CONDITIONS, UNITED STATES

How Do You SLEW A FIXED CURTAIN ANTENNA PATTERN?

By Jacques d'Avignon
monitor@limestone.kosone.com

OPTIMUM WORKING FREQUENCIES (MHz)
For the Period 15 April to 14 May 1997 Flux=79 SSN=14

The November 1994 issue of *Monitoring Times* carried an article I wrote on "The ALLIS Antenna/Transmitter Module." It described the new directional antennas now available to international broadcasters which make it easy to quickly and accurately change the direction in which the main broadcast is aimed. However, this new system is not widespread, and curtain antennas are still being used by most shortwave broadcasters around the world.

As implied by its name, a "curtain antenna" is a curtain of wire stretched between two or more high towers. Vertically, as many as four sets of broadband horizontal dipoles are installed; horizontally, you can install as many as four sets of broadband dipoles. The vertical and horizontal spacing between the dipoles are calculated to maximize the radiation pattern in the desired direction and in the preferred take-off angle.

These fixed structures contain not only the antenna, but also a reflector mounted behind the antenna; the reflector is another set of similar dipoles. These curtains can thus be used in two directions by reversing the role of the reflector side of the curtain to become the antenna: the antenna then becomes the reflector. However, this arrangement can only transmit properly in two main directions.

It may become necessary to change the main azimuth (boresight) of the maximum radiation of such an antenna to reach different targets. Today it is possible to construct curtains that can be mechanically turned around in azimuth, like the ALLIS. But before these new movable curtains were designed and constructed, engineers used an electrical technique called "slewing" when it was necessary to change the azimuth of the radiation. The maximum slewing possible is about 30 degrees on each side of the original boresight azimuth of the curtain.

All that's required to slew the antenna pattern is to slow down the progress of the radio waves in one part of the antenna and leave the rest of the antenna structure to radiate without any impediment. Slowing down the radiation on one side is achieved by introducing an electrically longer feed line in one section of the antenna feeding system. Very simple! The wave then takes more time to reach that specific part of the curtain, and the radiation pattern is slewed.

UTC	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
TO/FROM US WEST COAST																								
SOUTH AMERICA	20	18	18	17	14	12	12	11	11	11	9	10	10	13	15	16	17	17	19	20	20	21	21	21
WESTERN EUROPE	10	9	8	8	8	9	9	9	8	0	0	0	0	11	12	14	16	15	15	16	16	15	14	12
EASTERN EUROPE (P)	0	9	10	11	13	13	11	0	0	0	0	0	0	11	13	14	15	14	15	15	12	0	0	0
MEDITERRANEAN	13	13	13	12	12	12	0	0	0	0	0	0	0	0	14	15	16	17	17	17	17	16	15	14
MIDDLE EAST (P)	12	13	14	16	15	13	0	0	0	0	0	0	0	0	12	14	16	17	16	13	0	0	0	12
CENTRAL AFRICA	14	13	11	10	8	9	10	0	0	0	0	0	0	0	14	16	18	18	19	19	18	15	14	14
SOUTH AFRICA	0	10	10	9	8	8	11	10	0	0	0	0	0	0	15	16	18	19	16	0	0	0	0	0
SOUTH EAST ASIA (P)	17	17	17	17	16	14	0	0	0	0	0	10	10	10	11	13	14	15	15	14	0	0	0	16
FAR EAST	16	16	16	16	15	13	11	10	10	9	9	9	9	9	10	11	11	11	11	12	14	15	16	16
AUSTRALIA	22	22	21	22	21	17	14	13	12	12	12	11	11	10	11	12	12	0	0	0	0	19	21	22
TO/FROM US MIDWEST																								
SOUTH AMERICA	17	16	16	14	12	11	10	10	10	10	8	9	11	14	15	16	17	18	18	19	19	19	19	19
WESTERN EUROPE	12	10	9	9	9	9	9	9	9	0	0	11	13	14	15	16	16	16	16	16	17	17	16	15
EASTERN EUROPE	0	9	10	11	11	9	0	0	0	0	0	0	12	13	14	15	15	15	15	15	14	11	0	0
MEDITERRANEAN	12	13	13	12	11	10	0	0	0	0	0	0	13	14	16	16	17	17	17	17	16	15	14	13
MIDDLE EAST (P)	12	13	14	14	12	0	0	0	0	0	0	0	0	13	15	16	17	18	17	15	14	13	12	12
CENTRAL AFRICA	14	13	11	10	8	8	10	0	0	0	0	0	14	15	16	18	19	19	19	19	18	16	14	14
SOUTH AFRICA	10	10	10	9	8	8	10	10	0	0	0	0	14	15	16	18	19	19	16	0	0	0	0	0
SOUTH EAST ASIA (P)	16	16	16	16	15	0	0	0	0	0	0	9	10	12	13	14	14	14	14	14	0	0	0	16
FAR EAST	16	16	16	16	15	13	11	10	9	9	9	9	10	11	12	12	12	12	11	13	15	16	16	16
AUSTRALIA	20	20	20	19	17	14	12	11	11	11	11	11	10	11	12	13	12	0	0	0	0	19	20	20
TO/FROM US EAST COAST																								
SOUTH AMERICA	15	14	12	10	10	9	9	9	9	8	7	10	13	13	15	16	16	16	17	17	18	18	18	17
WESTERN EUROPE	11	9	9	8	9	8	8	8	8	0	10	12	14	15	16	17	16	16	16	16	16	15	15	13
EASTERN EUROPE	9	9	9	10	9	8	0	0	0	0	10	12	14	15	16	16	16	16	16	16	15	12	10	10
MEDITERRANEAN	10	12	12	11	10	9	9	0	0	0	0	13	14	15	16	16	16	17	17	17	15	13	12	12
MIDDLE EAST (P)	13	13	13	11	0	0	0	0	0	0	0	14	15	16	16	17	17	17	17	16	14	14	13	13
CENTRAL AFRICA	14	14	12	10	9	10	10	10	0	0	13	15	16	17	18	18	19	19	19	19	19	16	15	14
SOUTH AFRICA	10	10	10	9	8	8	11	11	0	0	15	16	17	18	19	19	19	16	0	0	0	11	10	10
SOUTH EAST ASIA (P)	16	15	14	0	0	0	0	0	0	0	12	13	15	16	14	13	13	14	14	14	13	0	0	14
FAR EAST	16	16	16	14	0	0	0	0	9	9	9	11	13	13	12	0	0	0	0	13	14	16	16	16
AUSTRALIA	19	18	17	15	12	0	11	10	11	11	10	10	12	12	12	13	0	0	0	0	18	18	18	18

Try to visualize a car on a slippery road when one wheel runs over an ice patch and loses traction: the power is delayed in reaching this wheel and the car swerves (slews)! The same thing happens to the radio wave in a curtain antenna when you introduce some delay one part of the antenna.

Slewing is not only used in the horizontal axis of a curtain antenna; the same principle can also be applied to the vertical radiation angle component of the curtain. In this axis it is not necessary to modify the angle very much to obtain some drastic changes—less than five degrees are sometimes all that is necessary to change your target area. By introducing a delay in the feed lines to the

vertical sets of dipoles, it is possible to change this vertical radiation pattern and thus the vertical angle of maximum radiation.

In summary, by introducing delays in the various feed lines of the antenna, you can change the azimuth of the maximum radiation pattern and the elevation angle of the maximum radiation vertical pattern.

Often, when a station is "slewing" its pattern, it will be transmitting the musical ID signal of the station. Listen for this signal on the hour and the half hour, and you might hear a change in the intensity of the signal on that frequency as the maximum signal is moving away or towards you.

Websites of Interest to Beginners

Traditionally, I devote the April column to books of use to beginners. But, being willing to bend *slightly* to the ways of the world, this edition will address that newest form of publication: the *website*. Access to the World Wide Web is as near as most home computers; if you have not yet added a computer to your shack, you do not need to feel left out. Most public libraries and many schools offer access to the Internet. Almost anyone can find a way to look at the websites we are about to discuss. So let's go surfin'!

<http://itre.ncsu.edu/radio/>

■ Shortwave Radio Catalog

Pete Costello is well known for his dedication to the radio hobby over the years. His latest labor of love is a super website for shortwave listeners of all skill levels on topics from DC to Daylight. Pete's self-stated mission is to "provide the shortwave and radio hobbyist with informative and timely links to services and information related to shortwave listening, satellite radio, and other topics on or about radio."

His home pages provide access to a comprehensive array of other websites, ftp and gopher sites (locations with files available for downloading), telnet services (remote control of another computer from your terminal), audio files, pictures, graphs, schedules, software, and interactive on-line programs.

The model he uses is a "catalog" that directs the user to various web pages covering radio services, shortwave, radio topics, medium wave, AM and FM broadcasting, and satellite radio. There is so much information available off this site that I often find myself spending an entire evening browsing. If you have limited experience with the World Wide Web, this is an excellent place to begin.

<http://itre.ncsu.edu/cgi-bin/cgi-swdbq>

■ What's on Shortwave Now?

This is another of Pete Costello's projects. Set to a UTC (coordinated universal time) time base, it gives you a listing of shortwave broadcasts that are on the air at the time you check in. Pete is the first to admit this is still an experimental database, but it is up to itera-

tion 4.0, and I find myself checking it whenever I'm planning a bit of light listening. Pete has other ideas for this project including using the data to complete an interactive global shortwave log tool for you to write/read a common log. If you want to get an idea of how the radio hobby and computers might interface in the future, keep an eye on this page.

<http://www.grove.net/~larry/uteworld.html>

■ Larry Van Horn's Utility World

If your shortwave listening leans more toward the utility frequencies, there is one stop on the Web you will have to make. Few are as well known for their expertise in utility monitoring as *MT*'s own Larry Van Horn. The layout of his particular website shows how Internet communications can serve as a great adjunct to other forms of communication—in this case, a magazine.

On this page you will find late-breaking news of use to utility monitors. No matter if it's on land, sea, air, or space this page will help you figure things out and even give suggestions on how to QSL those signals that fall between the shortwave broadcast bands.

<http://www.clandjop.com/~jcrusan/frn.html>

■ The Free Radio Network

You think information on the veiled world of pirate broadcasting would be hard to find? Not if you have access to the World Wide Web. This site is devoted to those forms of radio broadcasting that do not burden themselves with the rules and regulations established by various governments. It is the brainchild of John Cruzan and Kirk Trummel, who have gone to great lengths to create a truly international free radio website. Recently the page has included articles on British, German, Japanese, and Dutch pirate activity, as well as domestic information.

If you want to know how the pirate radio game is played, you can consult the page's "How-To" guides. They even include all the logical reasons *not* to try this stuff at home. The page also includes information about political clandestine stations as well as good data on "spy number" stations. This is another

page you could stay on all night.

<http://www.radiostation.com/>

■ Elliott Broadcast Services

Does it appear the shortwave folks are getting all the best stuff? Well, traditional broadcast band monitors can benefit equally from the World Wide Web.

This website allows the user to get information about domestic AM and FM stations by entering various forms of data. For example, If you only know a station's callsign, entering this will give you full data and information about the station. Likewise, you could enter other partial data such as city or state or frequency and get pointed in the right direction—just the tool for sorting out all those signals on the graveyard channels.

<http://www.anarc.org>

■ The ANARC home page

Radio hobby clubs and organizations have discovered the World Wide Web to be a great adjunct to their newsletters and other activities. The Association of North American Radio Clubs (ANARC) has helped facilitate the entry of clubs into this area, (as have some commercial sites such as Grove Enterprises which have provided free web space to non-profit radio clubs).

At the ANARC website, in addition to learning about ANARC itself, you will find links to all 17 ANARC affiliated radio clubs. For example, let me tell you a bit about three of these linked sites that I am most familiar with.

<http://www.anarc.org/naswa/>

■ The North American Shortwave Association (NASWA)

As one of the oldest active radio hobby clubs, NASWA has a lot of information to offer both the beginner and the more experienced radio hobbyist. NASWA, in an effort to further promote the shortwave hobby, has developed an excellent website that includes reprints of many past articles. If you have not had an opportunity to check out any shortwave club publications, this site gives you a good idea of the services that most radio clubs have to offer.

<http://aoscrpmdp.com/>
■ **The AOSC Home Page**

If you are a scanner person you can get the same feel for things by checking out the site of the All Ohio Scanner Club (AOSC). This scannist oriented web site includes club information, a club directory, AOSC sponsored events such as their annual picnic, and general scanner information that will help any beginning scannist get the hang of things. The page also includes a great list of scanner oriented links to other hobbyist pages.

<http://wcoil.com/~gnbc/>
■ **The National Radio Club (NRC)**

Medium wave (MW) folks will also find a friendly site on the World Wide Web. This site will give you complete information on the NRC's club and its services. You will also find a catalog of their many MW DXing publications. Sharing this page is the NRC affiliated organization, the DX Audio Service, which specializes in producing audio cassettes for radio hobbyists who are visually impaired.

<http://www.1stnet.net/~xtalset/index.html>
■ **The Xtal Set Society**

Old-time radio topics are also subjects of Internet communications. I have two favorites that I seldom pass up in my browsing sessions.

The Xtal Set Society is a group of folks totally dedicated to radio in its purest and simplest form. They are dedicated to the indepth study of crystal sets. They publish a bimonthly newsletter, and their website supports their efforts to keep this form of radio experimentation alive. This page includes a very handy guide to books about the subject of crystal sets. On this page you will even find a complete basic design for a good, old-fashioned, "Quaker Oat Box" crystal set, so you can join in the fun.

Since I discovered these folks, I've been having a ton of fun playing radio the same way it was done back in the beginning. I've been using everything from minerals such as Carborundum and graphite to old "blued" razor blades to detect radio signals.

<http://www.mindspring.com/~johnmb/>
■ **The Boatanchors WWW Page**

No, this has nothing to do with marine radio, except that many of these old beauties could monitor those frequencies. We're talking about vintage communications receivers. If you believe that "real" radios glow in the

dark, this is your page. On this site you can scan through dozens of pictures of beautiful old Collins, Hammarlund, Hallicrafters, and many other receivers. If you have taken on the labor of love of keeping a few of these old boat anchors alive, this site also provides many links to restoration information, including precious vacuum tube resources.

<http://www.arrrl.org/>
■ **The American Radio Relay League (ARRL)**

Ham radio is alive and well and—to some degree, at least—living on the World Wide Web. The ARRL has long been known for its many services to the amateur radio community. Until now, most of these services could only be discovered by reading League publications such as their monthly magazine, *QST*.

Their website offers a broad range of services to the amateur radio community. These include "The ARRL Letter" and "WIAW Bulletins." These amateur radio news services can be updated as often as daily and can alert the ham to late breaking news about DXpeditions or changes in radio communications legislation.

I used this page to keep track of the activity in the FCC's "Vanity" callsign program so I knew the right time to send in my application. This timely data allowed me to get the callsign N2EI with a minimum of hassle. Any active ham should be keeping one eye on this website at all times. Also, if you're not already involved in amateur radio, this page will help you get started.



<http://www.fcc.gov/>
■ **The Federal Communications Commission (FCC)**

The United States Government more or less gave birth to the internet through the old military DARPA.NET. I don't think they envisioned the sprawl we now call the World Wide Web. Even so, they have figured out how to take advantage of where the technology has gone.

For example, take a look at this site belonging to our dear friends in Washington who are "charged with regulating interstate and international communications by radio, television,

wire, satellite, and cable." On this site you will find the text of FCC staff speeches, a daily digest of commission activity, consumer information and downloadable forms for most common FCC transactions. The page sports an interesting "search engine" that allows you to enter a topic to get further information. A very useful page for any radio hobbyist.

<http://www.ntia.doc.gov/osmhome/nebbia.html>

■ **National Telecommunications and Information Administration**

Spectrum Use Summary 137 MHz - 10 GHz

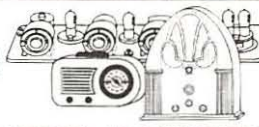
Be honest, before you read this title did you even know this government agency existed? Be that as it may, just as the header says, this website represents an overview of Federal and nonfederal spectrum use. If you want to get an idea of who is using what chunk of the radio frequency spectrum for what purpose, this is the website you need. This site is an especially handy tool if you go lurking around in those spaces between the more common stuff. A great way for a beginner to get to know the lay of the land.

<http://www.nws.noaa.gov/>
■ **National Oceanic and Atmospheric Administration**

While this is not strictly a radio website, I've included it because the weather often has a profound relationship to monitoring practice. Access to up-to-date forecasts and especially weather warnings can help you point your receivers to where the action is.

Coming to terms with how computers can help our monitoring efforts can be a lot of fun, once you have discovered several of the best hobby-related entry points to the World Wide Web.


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Ken Cornell, Silent Key

On January 6th, the longwave community suffered a major loss. Noted longwave pioneer Ken Cornell passed away following an extended illness. Ken was a regular contributor to the pages of *The Lowdown* journal, and authored numerous articles promoting longwave operation in both ham and SWL magazines.

He was also a mentor to me. It was his 1976 construction article in *Ham Radio* magazine that marked my entry into serious LF exploration. He was a constant advocate for getting your soldering iron out and building something new. While he had nothing against chasing beacons, he felt, quite rightly, I believe, that the hobby need not be limited to just listening.

Ken focused his efforts on the license-free 160-190 kHz Lowfer band, writing many construction articles for suitable transmitting and receiving designs. In fact, it is he who coined the term "Lowfer" in the first place—an acronym for "Low Frequency Experimental Radio Station."

His pioneering work on LF active antennas was another noteworthy accomplishment. He proved that longwires can actually be "noise collectors" on LF, and showed how even a city dweller could achieve good results with a small, properly placed active antenna. (Active antennas are now considered a mainstay in the longwave DXer's arsenal.)

Ken's longwave interests were not confined to two-way work. He was also active in the realm of natural radio and earthquake prediction through the use of ELF and VLF radio. Recent editions of his *Low & Medium Frequency Radio Scrapbook* reflected the diversity of his longwave interests.

Speaking of the *Scrapbook*, it saw 10 editions from 1972 through 1997. If the *ARRL Handbook* is the bible of amateur radio, then surely Ken's *Scrapbooks* are the low frequency equivalent. When I began this column in the summer of 1991, Ken sent me a signed copy of his original 1972 scrapbook and included an encouraging note to wish me success. This book will remain a special part of my longwave library. It is with great sadness that I say farewell to one of the hobby's greatest lights.

Web Update

For some time, I've been devoting occasional space to longwave-related Internet sites. There have been enough changes in recent



Ken Cornell's first and last editions of the *Radio Scrapbook*—A legacy of 25 years

months, however, that I believe a revamp of the listings is badly needed.

The following is a summary of currently active sites that I believe are worth exploring. If you have time to visit only a few, I recommend checking the ones with three stars (***). If you know of additional sites, please drop me a line with their URLs and we will present them as updates in future columns.

One reader wrote to express his disinterest in my coverage of Internet sites, since this column deals with radio, and not computers. While I can understand his concern, my feeling is that the 'Net is here to stay, and it offers a wealth of resources that can greatly enhance one's monitoring success. My continuing goal is to achieve a mix of coverage that offers enough variety and challenge for all readers.

Longwave Home Page (J. Davis)***
<http://members.aol.com/lwcanews/index.html>

The Navy/Air Force High Frequency Active Auroral Research Program (HAARP)***
<http://server5550.itd.nrl.navy.mil/projects/haarp/haarpindex.html>

Interactive NASA Space Physics Ionospheric Research Experiment (INSPIRE)***
http://www.gsfc.nasa.gov/education/inspire/inspire_home.html

Canadian Nondirectional Radiobeacons
<http://frodo.bruderhof.com/ka2qpg/>

U.S. Coast Guard DGPS information
<http://www.navcen.uscg.mil/dgps/dgps.htm>

U.S. Coast Guard Navigation Page
<http://www.navcen.uscg.mil/>

Current Solar Conditions***
<http://www.sel.noaa.gov/today.html>

Solar Terrestrial Activity Report
<http://dxlc.com/solar/>

WWV/H and WWVB information
<http://www.boulder.nist.gov/timefreq/>

The Art Of NDB Dxing, by Sheldon Remington***
<http://pw1.netcom.com/~spmegrvy/artoftoc.html>

Natural VLF Radio Homepage***
<http://www.triax.com/vlfradio/natradio.htm>

Worldwide Utility News Club
<http://www.leonardo.net/berri/wun/>

AirNav—U.S. Aviation Beacon Information
<http://www.airnav.com/>

Robert Kramer's Longwave Homepage
<http://members.aol.com/RKDX/longwave-home.html>

Robert Kramer's MW Homepage
<http://members.aol.com/RKDX/bcb.html>

Alex Wiecek's Longwave page—New site!
<http://www.ionsys.com/~magnum/longwave/longwave.htm>

Monitoring Times—1994-1996 Index for Below 500 kHz
<http://www.grove.net/hmpgmt.html>

Larry Van Horn's Utility World page—NDB Addresses
<http://www.grove.net/~larry/uteworld.html>

LF Amateur Radio Topics
<http://members.aol.com/warmspgs/lfham.htm>

The 73 kHz Page
<http://www.stonix.demon.co.uk/73kHz/>

Navy's ELF System
<http://server5550.itd.nrl.navy.mil/projects/haarp/elf/elf.html>

LWCA Official Homepage
<http://www.anarc.org/lwca/>

VLF Group Homepage—Stanford Univ.
<http://www.star.stanford.edu/~vlf/Welcom.html>

Antique Wireless Assn (AWA)***
<http://www.ggw.org/freenet/a/awa/index.html>

Spark Transmitter History & Development
<http://newton.otago.ac.nz:808/~ursi/belrose/spark.html>

End Notes

• For many years, Lowfer-hams have gathered on 1983 kHz (LSB) for an informal net on Sunday evenings. Word has come via the *Lowdown*, that the net has now moved, due to interference, to a frequency of 1961.5 kHz. While most activity is on Sunday evenings, you may also want to check this frequency on weeknights for some limited activity.

• The February '97 issue of *Popular Electronics* had an extensive article on longwave with an emphasis on Lowfers. Author Karl Thurber, W8FX, wrote 10 pages on the topic, which may qualify as the longest continuous magazine article on Lowfers! If you didn't see the article, I recommend trying to get a back issue at your local library. Karl promises another article soon on ELF/VLF exploration.

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Special package price: CD-ROM + SW Frequency Guide = \$70. More package deals available. Plus: Internet Radio Guide = \$35. Worldwide Weatherfax Services = \$42. Double CD Recording of Modulation Types = \$70 (cassette \$42). Radio Data Code Manual = \$50. Sample pages and colour screenshots can be viewed on our superb Internet WorldWideWeb site (see below). We have published our international radio books for 28 years. Payment can be made by cheque or credit card - we accept American Express, Eurocard, Mastercard and Visa. Dealer discount rates on request. Please ask for our free catalogue with recommendations from all over the world! ©

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Radio in the Frozen North

Most AM DXers in the USA and southern Canada are quite familiar with the Canadian Broadcasting Corporation (CBC). CBC outlets in southeastern Canada (740 and 940 kHz) are widely heard in eastern North America; stations in Canada's west (540, 690, and 990 kHz) are heard throughout the west. Another group of CBC stations is much less widely heard, but much more important in the daily lives of their local listeners.

CBC North is the primary source of information and entertainment for the Canadian Northwest and Yukon Territories and the extreme north of Quebec. This area of responsibility is larger than any U.S. state, and most countries! Radio programs originate from six "production centers" throughout the territories, and are broadcast from 27 AM and 38 FM transmitters. There are four TV production centers and 65 transmitters.

CBC North-Quebec broadcasts in French, Cree, and Inuktitut from studios in La Maison Radio-Canada in Montreal (the same building that houses Radio Canada International). These languages and English are also carried on a shortwave transmitter at the RCI site in Sackville, New Brunswick, on 9625 kHz.

CBC Eastern Arctic broadcasts from Iqaluit, (formerly known as Frobisher Bay) 1250 miles north of Montreal. Languages used are English and Inuktitut. Eastern Arctic programs are also carried on CBC Kivalliq, which adds some of

its own programs in English and Inuktitut. Kivalliq's own programs are produced at Rankin Inlet.

The most active CBC North regional center is at Yellowknife, the Northwest Territories' largest city. CBC Mackenzie broadcasts in English, North and South Slavey, Dogrib, and Chipewyan over 20 transmitters. The last of the CBC North stations in the Northwest Territories is CBC Western Arctic, headquartered at Inuvik. This center provides programming in English, Gwich'in, and Inuvialuktun.

Finally, the oldest of the CBC North stations is CBC Yukon. Based at the capital city of Whitehorse, this station covers the entire territory in English. It also carries programs in Gwich'in, produced by CBC Western Arctic.

There are three major production centers for CBC North TV: Yellowknife, Iqaluit, and Montreal. A news bureau is operated in Whitehorse. Programs are presented in English, Dene, Inuktitut, and Cree.

■ DXing CBC North

DXing these stations will be a major challenge for most readers. Communities in the North are small, so very little transmitter power is required to cover them. (Rural listeners are generally expected to use either satellite dishes or shortwave.) Of the 27 AM transmitters, the vast majority use less than 50 watts of power. The most likely target is the transmitter on 570

AM CALL CHANGES		
The following AM stations have changed call signs:		
Old Call	New Call	Location
WRJL-1170	WXRQ	Hanceville, AL
KCWR-550	KUZZ	Bakersfield, CA
KSPE-1490	KBKO	Santa Barbara, CA
KLVJ-1240	KMHI	Mountain Home, ID
WAQY-1600	WMRE	E. Longmeadow, MA
WWKN-1400	WRCC	Battle Creek, MI
WIMN-1220	WEZU	Stillwater, MN
KIRS-1590	KIHM	Sun Valley, NV
WNWZ-1430	WOWW	Germantown, TN
WUTK-850	WIOL	Knoxville, TN
KWTR-1530	KNEZ	Creedmore, TX
KDFX-1190	K000	Dallas, TX

kHz at Whitehorse, Yukon. This station operates at 5 kW daytime, 1 kW night. (Remember, in the far North "night" can be nearly 24 hours long in the winter, and nearly non-existent in summer!)

The only other likely target is the 860 kHz transmitter in Inuvik, which operates at 1 kW full-time. Two other transmitters use 1 kW of power, but on crowded local frequencies. If you do happen to be in a quiet location in Alaska, you might also look for CBC North on 690, 920, or 990 kHz.

DXers in south-central and southwestern Canada and the far northern USA stand a chance (admittedly, a very small one!) of hearing CBC

CBC North

We are the public broadcaster in Canada's North

We serve all the peoples of the North by doing our best to build understanding and create ways for Northerners to express themselves to each other and the rest of the country.

CBC North is the primary source of information and entertainment for 200,000 Canadians—and a challenging DX target!

North on FM. Most CBC North FM transmitters operate on 105.1, 106.1, or 107.1 MHz, again with very low power. One such transmitter was heard in southern Ontario by sporadic-E propagation in the early 1980s. The vast majority of CBC North TV transmitters operate on high-band channels 9 and 13, where sporadic-E is almost unheard-of. However, four transmitters use channel 2, one uses channel 4, and two use channel 6. Sporadic-E propagation is possible to these transmitters.

If you have a C-band TVRO dish, you can find CBC North radio and TV on the Anik E2 satellite at 107.3° West. See the Satellite Radio Guide in the latest issue *Satellite Times*, or just dial around. You'll find other interesting Canadian programming, both radio and TV, on this bird.

No matter which domestic band you're DXing, CBC North will certainly be an exotic catch!

■ Bits & Pieces

In southern Canada, two of the most commonly-heard CBC stations may soon disappear from AM. The Internet pages of the Canadian Radio-Television Commission (CRTC) indicate that both Montreal CBC AM stations have applied to move to FM. CBF (the French-language station on 690 kHz) wants 95.1 MHz, and CBM (the English-language station on 940 kHz) wants to move to 88.5 MHz.

On the U.S. side of the border, a new native-run station has appeared on the Anchorage,



Don't be fooled by French-language programming on the AM band. Radio France International now airs 2 hours of daily programming on WBPS-890 in suburban Boston.

DX TEST BULLETIN

These special broadcasts provide a unique opportunity to hear and identify the following stations. If you hear these broadcasts, please report to the address provided.

Sat, March 29 - WEGP-1390 (3 State Street Place, Presque Isle, ME 04769) will conduct a DX test 3 - 3:30 am EST with 5 kW nondirectional pattern. March music and Morse code IDs. Send reports to: Mr. Allan H. Weiner, WEGP-AM

April 1 - 30, WWCN-770 (P.O. Box 9600, Estero, FL 33928) will test at 1 kW directional every Monday through Thursday 12:30-1:00 a.m. EST (0530 - 0600 UTC). Morse code IDs inserted during their regular programming of old-time radio serials and vintage comedy. Send reports to: Mr. "Joey C." - Program Director.

Sun, April 7 - WHK-1420 (c/o WHLO Radio, 2780 South Arlington Road, Akron, OH 44312-4742. E-Mail: DaveyJohn@aol.com) will conduct a DX test at 5 kW nondirectional 3 - 3:30am EDT (0700-0730 UTC). Morse code IDs, test tones and "special music." **The station asks that there be no phone calls during the test.** Send reports to: Mr. Dave Johnson - Chief Engineer. Cassette tape reception reports are also welcome.

These tests were arranged by J.D. Stephens for the International Radio Club of America Courtesy Program Committee. (Send 32-cent stamp, or US\$1 or 1 IRC if overseas, to P.O. Box 1831, Perris, CA 92572-1831 for sample IRCA bulletin.)

Alaska, radio dial. Tad Cook of Washington State forwarded a news item about KNBA, 90.3 FM. Alaska has many native-operated radio stations, but they all serve rural populations. KNBA is the first station to serve the 19,000 Inuit, Aleut, and Athabaskan residents of Alaska's largest city. Public-affairs programming and adult rock music are aired.

DXers hearing French-language programming in New England have generally assumed they were hearing Quebec. This is no longer necessarily the case. Radio France International has been heard on shortwave for decades, but it's now also available at 890 kHz on the regular AM dial in Boston. Paul McDonough sent the ad which appears elsewhere on this page.

Last Christmas, many AM DXers heard WJDI-1620. This station doesn't appear in FCC records for good reason: it doesn't have a license. WJDI freely admits it was operating without a license and made no attempt to obtain one.

A station in Georgia was much less open about its unlicensed status. In early 1993, a construction permit was issued for a station on 102.1 MHz in Bolingbroke, Georgia, near Macon. As with all radio permits, it was good for 18 months, expiring in September 1994. It is common for the FCC to extend these permits, but only if the station has begun construction (or at least ordered equipment). In this case, no work had been begun. The Commission decided not to extend the permit.

This seemed to be the incentive needed to begin construction. In September 1995, a year after the construction permit expired, WDBS-102.1 went on the air! A visit from FCC engineers took the station off the air for a few days, but it promptly returned. Despite two further orders from the FCC's Washington office, broadcasts continued. WDBS continued to broadcast without a license until November

1996.

Finally, in late November, according to a report in the Griffin (Ga.) *Daily News*, the unlicensed station went silent. The AM station which had been hired to operate WDBS decided to end operations in order to avoid damaging WDBS's chances of having its permit reinstated. (I wonder if this permit really has any chance of reinstatement?!)

Here in the Nashville area, WMAK-1430 has returned to the air after a long silence: It's a 100 percent relay of WAMB-1160. The provisions of last year's Telecom Act require the FCC to revoke the license of any station that's been off the air for more than a year. For stations that have been silent for years, these provisions kicked in in early February. You should expect to hear many long-silent stations back on the air, often with strange and exotic programming! If you've heard anything unusual, let your fellow DXers know. Write: American Bandscan, Box 98, Brasstown NC 28902, or via the Internet at 72777.3143@compuserve.com.



Pirates Using World Wide Web on Internet

Although unlicensed free-form broadcasting is still the primary goal of shortwave pirate radio stations, an increasing number of pirates have carved out a presence on the internet. Almost every month we find new locations on the World Wide Web that promote pirate radio, and this month is certainly no exception. Many pirates have found that the internet is not competition for shortwave broadcasting, but is instead a good medium for spreading the word about unlicensed transmissions.

One of the best collections of Europirate web links is operated by SRS News in Sweden. A URL of <http://www-pp.hogia.net/jonny/links.html> takes you to a good selection of pirate sites, including European and North American operations. Among the interesting sites found here is the **Radio Marabu** page, with <http://www.dma.help/amphion/sztuka/Marabu.htm> as their newly restored link.

A less well known site is operated by the Clube DX-ista do Para, a DX club in Brazil. Their site has a pirate section, but general DX news from South America can also be found here. Point to <http://www.amazon.com.br/~djaci> for this unusual collection of material, which is bilingual in English and Portuguese.

The Shortwave Radio Catalog continues to be an amazingly exhaustive collection of web site links related to shortwave broadcasting and DXing. It has many pirate links, but all aspects of shortwave are referenced. Try <http://itre.uncc.edu/radio/> for this extremely useful resource.

■ Radio Cochiguaz

Radio Piraña, the longtime Europirate that recently moved to South America, now has some competition. **Radio Cochiguaz**, operating since February 2 for multiple hours around 0100 UTC on 6925.6 kHz, has been very widely heard in South America with its Andean music and Spanish language talks. But, I have not yet seen a logging of this fascinating station from a North American DXer. If you're trying for Cochiguaz, expect its operations to be irregular on late Saturdays and early Sundays.

■ Huntsville Drop Changes

The 'droperator of the Huntsville maildrop



Fearless Fred celebrates his tenth anniversary!

has announced that the box number has changed. Your reports to pirate stations using this address should now be directed to PO Box 11522, Huntsville, AL 35814. Reports sent to the old Box 605 should be forwarded for a while by the Post Office, but why take chances?

■ KIWI Still Active

Graham Barclay's **KIWI** in New Zealand is probably the most widely heard foreign pirate by listeners in North America. Randy Ruger of North Hollywood, CA, snagged one of their 1997 shows on 7475 kHz for 45 minutes at 0730 UTC. Sometimes they operate on 7445 kHz, so it pays to tune around 41 meters while looking for them on the weekends.

This station has expanded into the internet. Their internet web page at <http://www-pp.hogia.net/jonny/fr/kiwi.html> discusses the lengthy history of KIWI. It also includes discussions of other pirates.

■ Oromo Changes Frequency

According to BBC Monitoring, the Voice of Oromo Liberation has changed its frequency from 9870 kHz to 9930 kHz. This Oromo Liberation Front clandestine has been producing shows critical of the Ethiopian government since 1988. Their one hour program is scheduled at 1600 UTC on Monday, Wednesday, and Saturday. In *Numero Uno* #1411 and #1412, expert DXer Bob Hill of Massachusetts confirmed that this transmission can be heard in North America.

■ Clandestine Verie

Tony Benbenek of East Hampton, NY, reports that he received a QSL letter from

Radio Kudirat Nigeria. The station has been responding regularly to reports via NALICON, PO Box 9663, London SE1 3LZ, England. Their latest English language anti-Nigerian government schedule, transmitted from the Meyerton transmitters in South Africa, is a one hour program starting at 1905 UTC. This one claims credit for the increased international broadcasting hours by the Nigerian government in recent months.

■ Korean Crisis

Throughout 1997 there have been press accounts of the deteriorating situation in North Korea, made worse by continuing acute tension between the governments of North Korea and South Korea. A serious food shortage in the country is worsening as the economy collapses. A clandestine view of all this is available from the **Voice of National Salvation**, audible in North America about an hour before and after sunset on 4120 and 4450 kHz. The South Koreans often jam the signal viciously, so intelligibility varies from week to week.

■ Tellus Heard in Africa

Expert DXer Vashek Korinek of South Africa writes in to report reception of North American pirate **Radio Tellus**. His outstanding catch was at 6955 kHz on January 26 at 0145 UTC. This wasn't the first instance of North American pirate reception from Africa, since Vashek says he heard **Radio Confusion** and **KQSB** during the early 1980's. We send Vashek our congratulations for this amazing reception!

■ FM Pirate in Iowa

According to an article in the *Iowa City Icon*, **Iowa City Free Radio (ICFR)** has been transmitting on 88.7 MHz FM since January 20. Station co-chairs Jamie Schweser and Sarah Warren say that their mission is "to supply alternative programming to the current stale radio environment and provide the community a forum for responsible free speech." This operation transmits a 24 hour schedule. Thanks go to Terry Tauchen of Madison, WI, for a copy of the *Icon* article.

Literally scores of local FM pirates operate irregularly across the United States. If you

live anywhere near an urban area, a scan of your local signals might produce some very unusual listening!

■ What We Are Hearing

Your pirate loggings are always welcome via PO Box 98, Brasstown, NC 28902, or via the e-mail address at the top of the column. All frequencies are in kHz, with times in UTC. Our apologies go to Kenny Love, whose envelope with his home address got separated from his loggings.

North American pirate stations listed here use the following addresses: PO Box 1, Belfast, NY 14711; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 28413, Providence, RI 02908; PO Box 146, Stoneham, MA 02180; PO Box 11522, Huntsville, Alabama 35814; PO Box 88, Moline, MI 49335; PO Box 5617, Ventura, CA 93005; PO Box 293, Merlin, Ontario N0P 1W0; and PO Box 3103, Napier, New Zealand. For return postage, enclose three 32¢ stamps in the envelope to USA addresses. \$2 US or two International Reply Coupons go to foreign maildrops.

Alan Masyga Project- 6955 at 1930. Their format is fixed: Alan Parsons Project rock music mixed with plugs for DXer Alan Masyga. Addr: Providence. (Harold Frodge, Midland, MI; Michael Prindle, New Suffolk, NY; Rich and Talea Jurens, Katy, TX; Niel Wolfish, Toronto, Ontario; Barry Williams, Enterprise, AL)

Altered States Radio- 6955 at 0130. William Hurt is back with his complex shows, still offering a series of Dead Rock Stars QSL's. Addr: Merlin. (Jerry Coatsworth, Merlin, Ontario)

FBI Radio- 6955 at 0300. Don't think that J. Edgar Hoover inspired this one. The call on this rock station stands for "females broadcasting interference." Addr: None yet. (John Maky, Yuma, AZ)

Jerry Rigged Radio- 6958 at 2300. Dudley Do Right cartoon audio spices the rock and pop musical selections on this pirate. Addr: Providence. (Zeller)

K-2000- 6955 at 2000. The most popular pirate station of 1995 has returned. Their complex drama and parody sketches lampoon DXers and DXing in an extremely clever fashion. Addr: Stoneham. (Zeller)

KAMP- 6955 at 2000. This is another one of the Alan Masyga memorial stations, hosted by I. Am Nuts. Addr: Blue Ridge Summit. (Lee Silvi, Mentor, OH)

KDKK Relay- 1613 at 0400. William had a real catch here. Somebody was relaying KDKK-FM, 97.5 MHz in Park Rapids, MN, on the broadcast band. Tace heard a strange time signal broadcast on 1000 kHz, but apparently it was a promo stunt by KFRE in Fresno, CA. It pays to tune around medium wave occasionally! Addr: None. (William Hassig, Mt. Prospect, IL; Tace Hensley, Creswell, OR)

KIRK- 6955 at 2330. Identifying itself as the Voice of the Ozarks, their recent shows have been confusing mixes of ID's from about a dozen

other pirates including **Radio Doomsday**. You have to listen carefully here to realize that KIRK is the actual station. Addr: Still none. (Shawn Axelrod, Winnipeg, Manitoba; Kevin Nauta, Grand Rapids, MI; Frodge; Raven, Glen Dale, WV; Silvi, Jurens; Wolfish)

Let's Kill JTA Radio- 6955 at 0330. All pirates are not entertaining. This one tastelessly advocates felonies against the QSL columnist in *The ACE*. Addr: None. (Jurens; Williams)

Mystery Radio- 6955 at 0145. The Shadow still specializes in electronic music and recorded dramas, but he sometimes shows up with cameo ID's on other stations. Addr: Stoneham. (Doc May, Fresno, CA; Coatsworth; Prindle; Silvi; Jurens)

Omega Radio- 6955 at 2045. Most of Dick Tator's hard rock music is performed by Christian bands. Look for his "Spirit in the Sky" interval signal guitar riffs. Addr: Moline. (Nauta)

Radio Azteca- 6955 at 1830. Bram Stoker's hilarious DX parodies are transmitted regularly on the pirate bands. He says that he has pictures of me with Alice Brannigan of *PopComm*, but I don't remember posing for them. Addr: Belfast. (Coatsworth; Frodge; Silvi; Nauta; Hassig; Williams; Jurens; Wolfish)

Radio Garbanzo- 6955 at 1945. Fearless Fred and his sidekick Harry are back, with some of the funniest original comedy programming to be found on the radio today. Addr: Belfast. (Silvi)

Radio KAOS- 6955 at 0100. Joe Mama spices his rock music with comedy, such as ads for "Burger Kink." Addr: Belfast. (Steve Garrison, North Plainfield, NJ; Prindle; Williams; Silvi)

Radio Tellus- 6955 at 2115. Tellus Radio has changed its ID back to the original version, but it still features hard rock with occasional commentaries. Addr: Providence. (Vashek Korinek, Florida Hills, South Africa; Frodge; Prindle; Williams; Silvi)

Radio Three- 6955 at 2000. Sal Amoniac's syrupy MOR music supposedly plugs *The ACE*, but his non-verifying policy despite QSL announcements actually hurts that club. Addr: None. (Silvi; Frodge; Nauta; Wolfish; Prindle; Williams)

RKNA- 6955 at 2315. An old-timer from the 1980's has returned with programs of rock and parody sketches, which is a staple pirate format. Addr: Belfast. (Jurens)

Stereo Sound Radio- 6955 at 2330. Rich and I heard Colonel Billy Bob's classic rock program while at a DXpedition at Gifford Pinchot State Park in Pennsylvania. He verifies via the Free Radio Network at <http://www.clandjop.com/~jcrizan/frn.html> on the web. Addr: None yet. (Rich D'Angelo, Wyomissing, PA; Zeller; Love)

Voice of Baba Booe- 6955 at 2130. Apparently stealing their name from the Howard Stern show, they specialize in chants repeating the Baba Booe character's name. Addr: None. (Nauta; Zeller)

Voice of Helium- 6955 at 2145. The announcers on this gaseous station all sound like they have inhaled helium. They use a new maildrop that was unavailable at press time, but the old one should still work for a while. Addr: Blue Ridge Summit. (Dick Pearce, Brattleboro, VT; Zeller)

Voice of Indigestion- 6955 at 1830. There are frequent ID's on this rock music station, which isn't exactly good dinner music. Addr: None. (Pearce)

War of the Worlds- 6955 at 1900. Occasionally

a pirate brings back H. G. Wells' classic radio hoax. Addr: None. (Silvi)

WARR- 6955 at 0300. On his rock and drug shows, Captain Nobeard now mentions DXers who have heard him. But, his announced maildrop still says that it can't contact the station. Hm. Addr: Belfast? (Garrison; Love; Williams; Frodge; Silvi; Pearce)

WBIG- 6955 at 1545. "The Big One" plays "Industrial strength rock and roll straight from the mill." Addr: Belfast. (Jurens; Frodge; Wolfish; Pearce)

WLIS- 6955 at 0000. Rob received Charles Poltz' latest in a series of dozens of QSL's, showing Dick Pistek of *NAPRS* disguised as Boris Yeltsin. Addr: Blue Ridge Summit. (Robert Ross, London, Ontario; Love)

WLWLIS- 6955 at 1815. Pirates are famous for takeoffs on other pirates. This one mixes rock with "We Love WLIS" slogans plugging Jack Boggan's station. Addr: Providence. (Jurens; Frodge; Wolfish)

WOLD- 6955 at 2200. Their 1997 show featured Johnny Cash country music, but not much is known about them. Addr: None. (Silvi)

WPN- 6955 at 1500. A female announcer hosted rock on this one for Valentines Day, but Captain Squirtlong normally programs comedy material. Scott bagged their QSL. Addr: Huntsville. (Scott Krauss, Cleveland, OH)



Frank Carson's WREC QSL

WREC- 6955 at 2300. P. J. Sparx always mixes rock music and comedy, including a Dennis Rodman song to the tune of "Pretty Woman" that combines both. Addr: Blue Ridge Summit. (Frank Carson, Accokeek, MD; Ross; Wolfish; Pearce)

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Simple Building Projects

It's my experience that a large majority of us like to build gear. Even so, a lot of new hams may not try their hand at building for fear they will invest a lot of money in the project and it won't work. Therefore, it makes sense to keep our projects very simple, so the chances of success are much better.

Take a look at figure one. This simple keyer works great and can be built for under ten bucks. The circuit comes from G-QRP club member Don Benham, GW3ZFY. The only unusual component is the transistor—a BFY50 which is not available in this country; however, any common NPN transistor should work fine. (I built several using unmarked NPN transistors that I had in my junk box.) A total of 12 of these simple keyers are in use in my local area. So far no one has had any problem getting their keyer to work. Keying is solid, and speeds up to about 30 words per minute are possible.

Relays are available from Radio Shack or your local ham fest (ham fest prices for relays of this type run well under a dollar each). Build your keyer on a perfboard or on one of the project boards from Radio Shack. While a 9 volt battery works fine, I prefer to use a power cube plugged into the AC for home use.

Your keyer can be housed in almost anything, even inside your rig. Or if you prefer to see all the action, just stick a couple of adhesive feet to the bottom of the circuit board and let it all hang out.

Paddles in use with these keyers range from extra fancy to a pair of micro switches. One local amateur built a neat paddle for a few dollars from a scroll saw blade and number 10 brass screws on a 2 by 4 inch piece of 3/8 inch plywood.

Good Reading for Six Meter Hams

I received a nice newsletter from KD4VBI a few weeks ago. It is called the *The Independent Bohemian* and is dedicated to six meters. Contents range from operating news to technical topics and interesting tid-

bits and cartoons. The price is free, although I would urge you to drop a few dollars in the envelope with your request to help KD4VBI defray expenses. Send your request to KD4VBI, P.O. Box 9657, Riviera Beach, FL 33419-9657.

As a side note: over the years we have seen quite a few free newsletters of one type or another in this hobby. Since the person publishing the newsletter has an intense interest in the subject under discussion, such newsletters are usually quite good. However, the strain of gathering information, writing, and printing can be very tiring and quickly leads to burn-out. There is nothing more rewarding to such folks than to know their information is being read and appreciated. If you like the newsletter, let the publisher know. Send a few dollars, write an article, or send a report; but let the editor know how much you enjoy it.

New Novice and Tech Exam Questions

Effective July 1, 1997, there will be 35

questions in the Element 2 Novice exam, and Technician Element 3A will have 30 questions for a total of 65 questions for the No Code Tech, as opposed to the present 55 questions.

The question pool will contain a wider variety of information the new ham must absorb. Consequently, the license will be a bit more difficult to obtain.

Present manuals contain 636 questions; the new manuals will

show a 45 percent increase to 924 questions. New manuals should be ready in May.

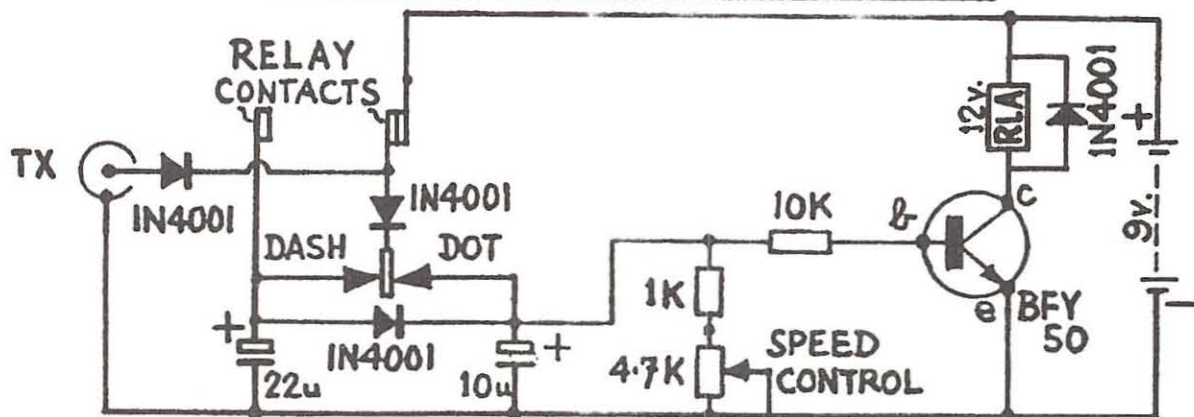
Propagation

Steady improvement in sunspot numbers has been bringing quite a few six and ten meter openings. Several ten meter openings to South America were very strong during January and early February, and European signals were dribbling through on several weekends. Signals from Europe peak between 1200 to 1400 UTC, while South America sneaks in quite often during the day and into the evening hours.

That's all for April, see ya next month. 73 de Ike, N3IK



SIMPLE KEYS — GW3ZFY



Schematic of simple keyer

Synthesized FM Stereo Transmitter



Microprocessor controlled for easy freq programming using DIP switches, no drift, your signal is rock solid all the time - just like the commercial stations. Audio quality is excellent, connect to the line output of any CD player, tape deck or mike mixer and you're on-the-air. Foreign buyers will appreciate the high power output capability of the FM-25; many Caribbean folks use a single FM-25 to cover the whole island! New, improved, clean and hum-free runs on either 12 VDC or 120 VAC. Kit comes complete with case set, whip antenna, 120 VAC power adapter - easy one evening assembly.

FM-25, Synthesized FM Stereo Transmitter Kit \$129.95



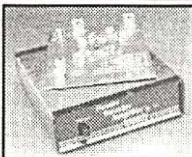
Tunable FM Stereo Transmitter

A lower cost alternative to our high performance transmitters. Offers great value, tunable over the 88-108 MHz FM broadcast band, plenty of power and our manual goes into great detail outlining aspects of antennas, transmitting range and the FCC rules and regulations. Connects to any cassette deck, CD player or mixer and you're on-the-air, you'll be amazed at the exceptional audio quality! Runs on internal 9V battery or external power from 5 to 15 VDC, or optional 120 VAC adapter. Add our matching case and whip antenna set for a nice finished look.

FM-10A, Tunable FM Stereo Transmitter Kit \$34.95

CFM, Matching Case and Antenna Set \$14.95

RF Power Booster Amplifier



Add some serious muscle to your signal, boost power up to 1 watt over a frequency range of 100 KHz to over 1000 MHz! Use as a lab amp for signal generators, plus many foreign users employ the LPA-1 to boost the power of their FM Stereo transmitters, providing radio service through an entire town. Power required: 12 to 15 volts DC at 250mA, gain of 38dB at 10 MHz, 10 dB at 1000 MHz. For a neat, professionally finished look, add the optional matching case set.

LPA-1, Power Booster Amplifier Kit \$39.95

CLPA, Matching Case Set for LPA-1 Kit \$14.95

LPA-1WT, Fully Wired LPA-1 with Case \$99.95



Micro FM Wireless Mike

World's smallest FM transmitter. Size of a sugar cube! Uses SMT (Surface Mount Technology) devices and mini electret condenser microphone, even the battery is included. We give you two complete sets of SMT parts to allow for any errors or mishaps-build it carefully and you've got extra SMT parts to build another! Audio quality and pick-up is unbelievable, transmission range up to 300 feet, tunable to anywhere in standard FM band 88 to 108 MHz. 7/8" w x 3/8" h x 3/4" h.

FM-5 Micro FM Wireless Mike Kit \$19.95

Crystal Controlled Wireless Mike



Super stable, drift free, not affected by temperature, metal or your body! Frequency is set by a crystal in the 2 meter Ham band of 146.535 MHz, easily picked up on any scanner radio or 2 meter rig. Changing the crystal to put frequency anywhere in the 140 to 160 MHz range-crystals cost only five or six dollars. Sensitive electret condenser mike picks up whispers anywhere in a room and transmit up to 1/4 mile. Powered by 3 volt Lithium or pair of watch batteries which are included. Uses the latest in SMT surface mount parts and we even include a few extras in case you sneeze and loose a part!

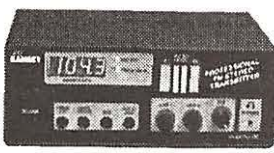
FM-6, Crystal Controlled FM Wireless Mike Kit \$39.95

FM-6WT Fully Wired FM-6 \$69.95

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Super Pro FM Stereo Radio Transmitter



A truly professional frequency synthesized FM Stereo transmitter station in one easy to use, handsome cabinet. Most radio stations require a whole equipment rack to hold all the features

we've packed into the FM-100. Set frequency easily with the Up/Down freq buttons and the big LED digital display. Plus there's input low pass filtering that gives great sound no matter what the source (no more squeals or swishing sounds from cheap CD player inputs!) Peak limiters for maximum 'punch' in your audio - without over modulation. LED bargraph meters for easy setting of audio levels and a built-in mixer with mike and line level inputs. Churches, drive-ins, schools and colleges find the FM-100 to be the answer to their transmitting needs, you will too. No one offers all these features at this price! Kit includes sharp looking metal cabinet, whip antenna and 120 volt AC adapter. Also runs on 12 volts DC.

We also offer a high power export version of the FM-100 that's fully assembled with one watt of RF power, for miles of program coverage. The export version can only be shipped outside the USA, or within the US if accompanied by a signed statement that the unit will be exported.

FM-100, Professional FM Stereo Transmitter Kit \$299.95

FM-100WT, Fully Wired High Power FM-100 \$429.95

Speech Descrambler Scrambler



Decode all that gibberish! This is the popular descrambler / scrambler that you've read about in all the Scanner and Electronic magazines. The technology used is known as speech inversion which is compatible with most cordless phones and many police department systems, hook it up to scanner speaker terminals and you're in business. Easily configured for any use: mike, line level and speaker output/inputs are provided. Also communicate in total privacy over telephone or radio, full duplex operation - scramble and unscramble at the same time. Easy to build, all complex circuitry contained in new custom ASIC chip for clear, clean audio. Runs on 9 to 15VDC, RCA phono type jacks. Our matching case set adds a super nice professional look to your kit.

SS-70A, Speech Descrambler/Scrambler Kit \$39.95

CSS, Custom Matching Case and Knob Set \$14.95

SS-70AWT, Fully Wired SS-70A with Case \$79.95

AC12-5, 12 Volt DC Wall Plug Adapter \$9.95

Tone-Grabber Touch Tone Decoder / Reader



Dialed phone numbers, repeater codes, control codes, anywhere touch-

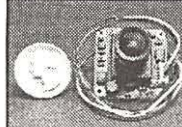
tones are used, your TG-1 will decode and store any number it hears. A simple hook-up to any radio speaker or phone line is all that is required, and since the TG-1 uses a central office quality decoder and microprocessor, it will decode digits at virtually any speed! A 256 digit non-volatile memory stores numbers for 100 years - even with the power turned off, and an 8 digit LED display allows you to scroll through anywhere in memory. To make it easy to pick out numbers and codes, a dash is inserted between any group or set of numbers that were decoded more than 2 seconds apart. The TG-1 runs from any 7 to 15 volt DC power source and is both voltage regulated and crystal controlled for the ultimate in stability. For stand-alone use add our matching case set for a clean, professionally finished project. We have a TG-1 connected up here at the Ramsey factory on the FM radio. It's fun to see the phone numbers that are dialed on the morning radio show! Although the TG-1 requires less than an evening to assemble (and is fun to build, too!), we offer the TG-1 fully wired and tested in matching case for a special price.

TG-1, Tone Grabber Kit \$99.95

CTG, Matching Case Set for TG-1 Kit \$14.95

TG-1WT, Fully Wired Tone Grabber with Case \$149.95

AC12-5, 12 Volt DC Wall Plug Adapter \$9.95



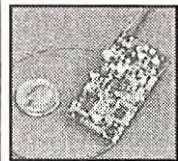
Mini-Peeper Micro Video Camera

Super small, high quality fully assembled B & W CCD TV camera the size of an ice cube! Provides excellent pictures in low light (2 lux), or use our IR-1 Infra-Red light source to invisibly illuminate an entire room on a pitch black night! Imagine the possibilities... build it into a smoke detector, wall clock, lamp, book, radio. Exact same camera that's in big buck detective catalogues and stores. Kit includes: fully assembled CCD camera module, connectors, interface PC board kit with proper voltage regulation and filtering, hook-up details, even a mini microphone for sensitive sound! Two models available: Wide Angle Lens 3.6mm/12, adjustable focus lens, 92 degree view. Pinhole Lens 5.5mm/14.5, 60 degree view. The Pinhole Lens is physically much flatter and provides even greater depth of focus. The camera itself is 1.2" square. The Wide Angle Lens is about 1" long. Pinhole Lens about 1/2", interface PC board is 1" x 2" and uses RCA jacks for easy hook-up to VCRs, TVs or cable runs. Power required is 9 to 14 VDC @ 150 mA. Resolution: 380 x 350 lines. Instruction manual contains ideas on mounting and disguising the Mini-Peeper along with info on adding one of our TV Transmitter kits (such as the MTV-7 unit below) for wireless transmission!

MP-1, Wide Angle Lens CCD TV Camera Outfit \$169.95

MP-1PH, Pin-Hole Lens CCD TV Camera Outfit \$189.95

MicroStation Synthesized UHF TV Transmitter



Now you can be in the same league as James Bond. This transmitter is so small that it can fit into a pack of cigarettes - even including a CCD TV camera and battery! Model airplane enthusiasts put the MTV-7A into airplanes for a dynamite view from the cockpit, and the MTV-7A is the transmitter of choice for balloon launches. Transmitter features synthesized, crystal controlled operation for drift-free transmission of both audio and video on your choice of frequencies: Standard UHF TV Channel 52 (which should only be used outside of the USA to avoid violating FCC rules), and 439.25 MHz or 911.25 MHz which are in the amateur ham bands. The 439.25 MHz unit has the nifty advantage of being able to be received on a regular 'cable-ready' TV set tuned to Cable channel 68, or use our ATV-74 converter and receive it on regular TV channel 3. The 911.25 MHz unit is suited for applications where reception on a regular TV is not desired, an ATV-79 must be used for operation. The MTV-7A's output power is almost 100 mW, so transmitting range is pretty much 'line-of-sight' which can mean many miles! The MTV-7A accepts standard black and white or color video and has its own, on-board, sensitive electret microphone. The MTV-7A is available in kit form or fully wired and tested. Since the latest in SMT (Surface Mount Technology) is used to provide for the smallest possible size, the kit version is recommended for experienced builders only. Runs on 12 VDC @ 150 mA and includes a regulated power source for a CCD camera.

MTV-7A, UHF TV Channel 52 Transmitter Kit \$159.95

MTV-7AWT, Fully Wired Channel 52 Transmitter \$249.95

MTV-7A4, 439.25 MHz TV Transmitter Kit \$159.95

MTV-7A4WT, Fully Wired 439.25 MHz Transmitter \$249.95

MTV-7A9, 911.25 MHz TV Transmitter Kit \$179.95

MTV-7A9WT, Fully Wired 911.25 MHz Transmitter \$269.95

ATV-74, 439.25 MHz Converter Kit \$159.95

ATV-74WT, Fully Wired 439.25 MHz Converter \$249.95

ATV-79, 911.25 MHz Converter Kit \$179.95

ATV-79WT, Fully Wired 911.25 MHz Converter \$269.95

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Eliminating Spurious Signals in Your Receiver

It is likely that you have heard strange beat notes and buzzing sounds in the output of your receiver, but did not know what they were or where they originated. Some of these annoying "birdies" fall on favored monitoring frequencies to spoil reception. This is especially troublesome when we try to copy weak DX (distant) signals through unwanted radio frequency (RF) energy that enters the front ends of our receivers. Many of these interfering blobs of RF energy are generated within our homes by TV receivers, VCRs, computers, microwave ovens, and other appliances.

How Do the Birdies Reach a Receiver?

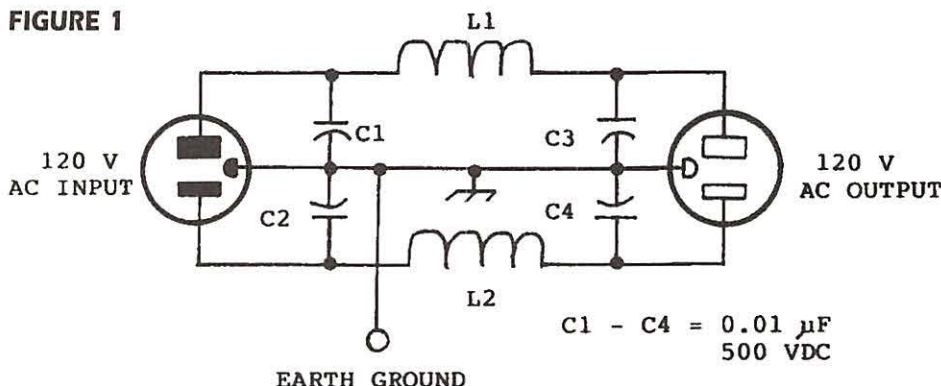
There are various paths over which spurious signals travel. Some migrate along the ac power wiring in our homes and enter our receivers via the ac line cord. In other instances unwanted RF energy enters the ac power service at the source of the offending signal (TV set, for example) and is radiated through the air by means of the outdoor service drops and main power lines. These conductors act as antennas to broadcast unwanted signal energy. Our receiving antennas pick up these annoying signals, and we hear them in our speakers or headphones.

Another common conveyance for spurious signals is the TV antenna and its feed line. The color-burst oscillator and horizontal sweep circuit generate strong spurious energy that can radiate. The color-burst bleep is heard at 3.57954 MHz, and sometimes at harmonics of that frequency. The TV horizontal oscillator frequency is 15.750 kHz. This energy can be heard at its harmonics, every 15.750 kHz across the receiver tuning range.

Generally, these birdies are troublesome only from very low frequencies (VLF) through about 4 MHz. The harmonics are too weak to be heard above 4 MHz. These signals sound buzzy and change pitch as the video level of the TV signal changes. This, and the color-burst oscillator energy, is radiated by the TV feed line, antenna, and ac power line if filtering is not used at the source points.

Other spurious signals are emitted by hi-fi equipment and various computerized home appliances. Radio frequency interference (RFI) prevention methods are essentially the same for

FIGURE 1



Circuit for a brute-force ac line filter. The coils are wound on broom handle sections, dowel rod or PVC tubing (see text). Capacitors are 0.01-μF, 630-VDC units (see note 1). One male and one female ac receptacle are required for this filter. It must be enclosed in protective box for reasons of personal safety.

all types of RF interference. We will highlight some remedies this month.

Power Line Filtering

The so-called "brute force filter" has been around since the earliest days of radio. It consists of two coils of wire and four bypass capacitors. A practical circuit is shown in figure 1. The greater the number of L1 and L2 turns, the lower the effective frequency of the line filter. The bypass capacitors must be able to sustain the level of ac line voltage at your

home. Play it safe and use 0.01-μF units with a rating of 500 VDC or greater for 120-volt service.¹ An earth ground must be connected to filter in order for it to do its job. The cold-water pipes in your home should provide a suitable ground, assuming they are made of copper or iron, rather than PVC tubing.

Coils L1 and L2 may consist of as many close-wound turns of no. 14 or 16 enameled as wire you can wind on 6-inch lengths of broom stick, 1-inch PVC tubing or wooden dowel rod. It is a good idea to use two coats of polystyrene varnish on the wooden forms, if they are used,

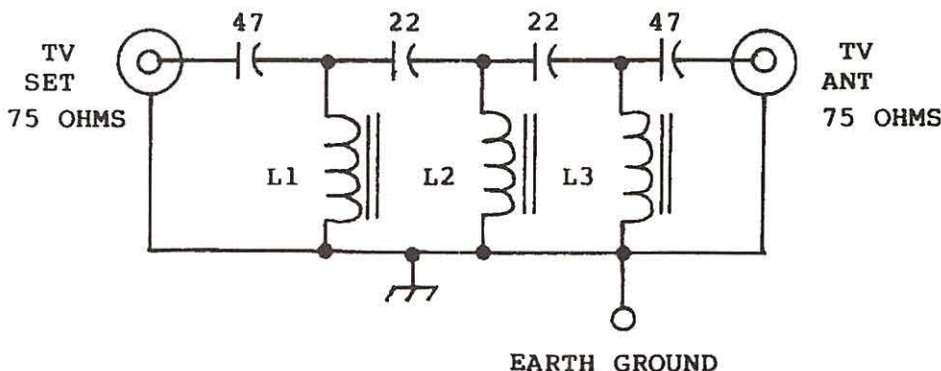


FIGURE 2 — A 75-ohm high-pass filter for preventing radiation from TV receivers via the feed line and antenna. L1 and L3 have 12 turns of no. 24 enamel wire on Amidon T44-0 toroid cores (see note 2). L2 has 11 turns of no. 24 enamel wire on the same type of toroid core. Close-tolerance (5 percent) NP0 ceramic capacitors are recommended for this circuit. They are available from the supplier in note 1. Keep all leads as short and direct as possible. This filter circuit was borrowed from the 1997 edition of The ARRL Handbook, page 28.6.

before the wire is added. This will prevent the coil forms from absorbing moisture later on. Make certain the coils do not touch the metal box in which you build the filter. A plastic box may be used if you include a ground terminal for access from the outside the box.

Brute-force line filters are the most effective when installed at the source of the interference. For example, I use one with six ac outlets. It is mounted inside my hi-fi entertainment center. Each unit of hi-fi equipment, plus the TV set, is plugged into the filter. A second ac-line filter installed at your receiver is a good idea. It will prevent stray RF energy, picked up by the ac line, from entering your receiver via that route. Brute force line filters are useful also when connected to transmitters. They help prevent unwanted RF energy from entering the ac line and causing interference to TV receivers and hi-fi equipment.

■ Other Filtering Methods

Interference is a two-way street. Suppressors that are used at hi-fi equipment are effective not only for preventing interference to short-wave receivers, but for protecting TV sets, FM tuners, VCRs, and other hi-fi gear from interference if you are a radio amateur and use a transmitter.

Crud from TV receivers can be choked off at the TV set by using a high-pass filter at the antenna terminals of the TV receiver. Figure 2 illustrates a practical high-pass filter you can construct for use in 75-ohm coaxial feed lines. It allows TV signals to reach the tuner, but prevents spurious energy within the TV set from entering the TV feed line and antenna where it can be radiated.

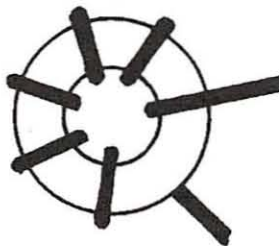
The two-way street principle also applies here: A high-pass filter usually prevents fundamental overloading (blanketing) of a TV receiver from transmitted amateur radio or citizen band (CB) signals. The filter will not be effective in suppressing harmonic energy from ham-radio or CB transmitters, which shows up on the TV screen as a herringbone pattern or cross hatch. A high-pass filter may be used also at the input of an FM receiver. These filters need to be grounded in the same manner as brute-force line filters.

■ How to Use Ferrite Suppression Devices

Ferrite toroids, rods, and clamp-on cores are useful for preventing RF energy from traveling along ac line cords, speaker leads, and coaxial feed lines. These components are available by mail.² The usual practice is to loop several turns of the involved cable through a large toroid

FIGURE 3

**TOROID
CHOKE**



**FERRITE
ROD CHOKE**



Methods for using ferrite toroids and rods for RFI suppression. These chokes should be located as near to the equipment chassis as possible for best results. Amidon FT-240-43 or FT-240-43 toroids (see text) are suitable for winding toroid chokes. Ferrite rods are scarce on today's market, and they are quite expensive. The ferrite bars and rods on which AM radio loop antennas are wound may be used for choke forms. They have a permeability of approximately 125 (no. 61 material).

core, or around a ferrite rod, near the chassis of a piece of electronics equipment. The core material does not impede the flow of desired energy, but keeps unwanted RF energy from flowing past the point where the suppressor is installed. Clamp-on ferrite devices are supplied in mating halves to permit placing them over flat multiconductor cables that may radiate interfering (or arriving) RF energy. Cables of this type are found, for example, in computers. Figure 3 shows how you can use ferrite core material for suppressing RFI.

No. 43 ferrite core material is preferable for RF suppression jobs below 10 MHz. It has a permeability of 850. For the frequencies above 10 MHz I prefer to use no. 61 ferrite (permeability = 125). See reference 1 for product availability.

■ Closing Comments

None of the suppression techniques I have described are difficult or expensive to imple-

ment. Some experimentation will be required in order to find the most effective cure for your particular interference problem. A quality earth ground on your receiver and the appliances that are creating the interference should be the first "bandaid" you try. An antenna fed with coaxial cable, as opposed to an end-fed piece of wire, is recommended for minimizing unwanted pickup of spurious energy. When possible, locate the antenna as far from the house and power lines as practicable.

■ Notes

1 — This part, no. E6103-ND, is available from Digi-Key Corp., 701 Brooks Ave. South, Thief River Falls, MN 56701, Phone: 1-800-344-4539 for ordering or a catalog.

2 — Amidon Associates, Inc., 250 Briggs Ave., Costa Mesa, CA 92626. Phone: (714) 850-4660. Catalog available.

Shortwave Receivers Past & Present

Communications Receivers 1945-1996

- New 2nd Ed.
- 80 Chapters
- 350 Pages
- 600 Photos
- Printed Jan. 97
- Covers 1945 to 1996.
- 500 Receivers
- 400 Variants
- Includes 70 U.S. and Intl. manufacturers
- \$19.95 (+\$2 ship)

This huge 350 page Second Edition includes over 500 shortwave and amateur communications receivers made from 1945 to 1996. Here is everything you need to know as a radio collector or informed receiver buyer. Entry information includes: receiver type, date sold, photograph, size & weight, features, reviews, specifications, new & used values, variants, value rating and availability. Seventy American and worldwide manufacturers are represented. Become an instant receiver expert!

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♦ FAX: 614 866-2339

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radio inc.**

The Readers Speak

Welcome aboard, everyone. We're throwing the doors open today for a column-long Readers Corner. I've received so much input lately from readers that it was decided to devote the column to some of the material you contributed.

■ Ground Avoidance in Alaska

A subscriber who works for Alaska Airlines contributed the following news item: Alaska Airlines plans to equip its 737-400 fleet with an enhanced ground proximity warning system (GPWS) which will be integrated with global positioning satellite (GPS) navigation data. The carrier will spend at least \$10 million to purchase and install the equipment in the airline's 25 737-400s, train flight crews, and equip simulators. Once the appropriate certifications are obtained, the new avionics are expected to dramatically increase safety as well as arrival and departure reliability at airports where surrounding terrain restricts bad-weather operations.

Alaska is evaluating GPS approaches using two 737-400s flying on regularly scheduled routes to Juneau (Alaska). The testing requires visual flight conditions. The EGPWS is envisioned to continuously compare terrain information stored at its worldwide data base to precise position input provided by the aircraft's GPS. The EGPWS automatically plots the aircraft flight path based on GPS-derived position and altitude data; it provides a visual display on the aircraft's electronic flight information system (EFIS) navigation screen, as well as producing an audible alert when the projected course nears a land mass, especially mountains.

■ Albuquerque Frequencies

John Tate contributed these frequencies from Albuquerque International Airport:

Approach	121.100	123.900
	126.300	
Departure	127.400	124.400
Clearance Delivery	119.200	
Tower	118.300	120.300
ATIS	118.000	
Ground	121.900	
Flight Service Station	113.200	122.100
	122.300	122.550
Ramp Frequencies		
Continental	460.650	
Delta	460.875	

TWA 460.675
United 460.725
Thanks, John!

■ Internet Mailing List

Mike Agner sends us information about an internet mailing list for aero comms monitors. Mike explained that a mailing list is a central point to which interested persons may subscribe in order to exchange news and views on a specific topic. In this case, ACARS is the subject. Mike and Iain Taylor have started this mailing list, which runs through the internet server at Grove Enterprises.

The service is free and to subscribe, all you have to do is go to your e-mail program and issue a message to majordomo@grove.net (no subject line and the signature block turned off). In the body of the message type: *subscribe acars*. That's all there is to it. News and traffic about ACARS should be forthcoming within a day or so from the subscribers to the list.

There is also a digest list, which means that many messages are gathered together and sent as one file. If you want to subscribe to the digest, issue the following message to majordomo@grove.net (again, no subject line and turn the signature block off). In the body of the message type: *subscribe acars-digest*.

In light of the several ACARS decoders now available this e-mail list should be of particular interest to aero enthusiasts.

■ Types of Radar

Alex T., an air traffic controller, contributed the following information: Radar coverage comes from various areas with regard to air traffic control. Take the airport, for example. The controllers in the tower have what is known as a BRITE display, for short range tracking around the airport grounds and surrounding areas. Then, in the approach and departure radar room, radar coverage is referred to as airport surveillance radar, or ASR for short. It is coupled with the secondary surveillance radar (SSR) under the automated radar terminal system called ARTS III.

Secondary radar displays differ from primary radar displays in that they are returns from an airborne transponder rather than a reflected signal. ASR is medium range radar for the control of traffic in the vicinity of an

airport with a normal range of about 60 miles. Moving targets, fixed targets, and precipitation areas are displayed on the controller's radarscope.

Another type of radar system that aids pilots in landing is called precision approach radar (PAR). PAR equipment may be used as a primary landing aid or it may be used to monitor other types of approaches. PAR searches the final approach to a runway. It is designed to display azimuth, range, and elevation over a small area and is effective as a landing aid in extremely poor weather. It's accurate enough to detect variations of 300 feet in range, and at one mile, variation of 10 feet in elevation and 20 feet in azimuth can be observed. Approaches usually begin within 10 miles of the airport, so the limited range of the PAR does not hinder its intended use. PAR is utilized more by military aircraft than by their civilian counterparts.

In the air traffic control centers, primary radar is known as air route surveillance radar-2 (ASRS-2) and is also coupled with SSR. The center automation system is slightly different from the terminal's system when it comes to radar data processing in that the center radar display is entirely digitized. The computer is the focal point of the center's air traffic control (ATC) system. In this case, the host computer is a larger, faster, and more capable model than any used before and is a building block for the advanced automation system that is approaching.

Flight plans for aircraft operating within the center area come to the center computer. The center then generates clearances for each and sends them back to the originating terminal. The computer creates appropriate flight progress strips for the sectors the aircraft will fly through and informs the adjacent center of the proposed flight. When the aircraft is airborne, the computer updates the estimated flight times, if necessary, and provides current information for all sectors where required.

Maximum range of the equipment is 200 miles, and on his radarscope a controller can select a presentation of 25, 50, 100, or the full 200 miles. Aircraft may be detected to well above 50,000 feet.

That's all for this month. Thanks to all contributors for their material! See you in May; until then, 73 and out.



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1. Cell blocked, no blocks OK for FCC qualified users
2. At press time the R10 had not been FCC certified.

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NEW SRX100 from LOWE

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Regular discount price \$299.95,
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FREE headphones incl.



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It's that time of year again when everyone needs a weather station. The DAVIS WEATHER WIZARD III provides all the WX information you need. #7425



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Antennas designed for best reception. Extend your range. All cover 25MHz-1900MHz with BNC connectors.



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Telescoping antenna included \$19.95 Value !!!

ICOM R8500

IT'S NEW...IT'S FANTASTIC

- 100kHz - 2000MHz*
- Improved Audio
- 4 Filter B.W.
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- Prices subject to change
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Out of the Mouths of "FBI Babes"

South Florida has been an interesting place to be the past few months. The City of Hollywood, which is just south of Ft. Lauderdale, placed some of its used city equipment up on the surplus block. Along came Alan Leonard, who owns Communications Electronics Engineering, of Miami, Florida. Mr. Leonard goes around and buys up surplus electronic equipment from municipal governments.

On December 13, 1995, Mr. Leonard prepared a three page list of equipment he wished to purchase from the City of Hollywood. Included in this list were four police towers and the unneeded equipment used to dispatch the cities of Dania and Hallandale. (It should be noted at this point that the above cities have gone over to 800 MHz trunking.) The document was co-signed by Mr. John Weyrauch, the City of Hollywood purchasing director. The check was given and the equipment changed hands.

Mr. Leonard carried away the equipment, including the trunking equipment not being currently used, and then started to dismantle the towers. That is when the city realized they had made a big mistake. Although Mr. Leonard was entitled to towers located at Dania and Hollywood police departments, city officials said the Hollywood police tower was never a part of the deal.

City officials admit they should have paid more attention to the contract. Mr. Leonard vowed a fight to the finish.

What does this have to do with federal communications? The above incident drew the attention of Motorola security and the FBI. Documents filed in federal court show the FBI began an investigation in January 1996, after they received a telephone call from Joe Krause, Motorola attorney. Mr. Krause told the FBI that he suspected Leonard was in possession of Motorola software which he was using to program Motorola radios.

The complaint was then turned over to FBI Special Agent Kathleen Antona, who specializes in high-technology crime. Special Agent Antona found probable cause to believe that more than eight times during 1996 Mr. Leonard had assembled Motorola radios from scrapped radio parts.

The FBI then further claims he then used a computer and illegally obtained software to program the radios, which he sold as genuine

Motorola radios, without permission from the company.

Antona also found probable cause to believe that Leonard made unauthorized changes to the radio programming software contained in the Motorola radios.

In a quote from Antona: "The changes gave Leonard the capability of producing, using, and selling radios—illegally—the Motorolas communications system used by the FBI and other law enforcement agencies."

Mr. Leonard is no saint. He was convicted of second degree murder, conspiracy, and attempted robbery with a firearm for participation in the February 17, 1978, attempted robbery at the Round Table Restaurant in Coral Gables, Florida. Leonard's two companions in the incident—one of whom was a police informant—were killed in a shootout with the Coral Gables police.

In a final footnote to this story: during the first week of 1997, Mr. Leonard had a meeting with City of Hollywood officials in which he signed an agreement releasing any claims to the police towers. The above information is from the January 4, 1997, issue of the *Miami Herald*.

How does this affect us federal monitors? The municipalities above used an 800 MHz trunked radio system, as does much of South Florida now. There has been a decrease in 160/406 MHz federal traffic. This has been addressed in the past few columns. Suddenly VHF antennas have disappeared from the federal cars.

It was the above quote from FBI agent Antona that got me thinking. Traditional VHF and UHF frequencies can be readily programmed into traditional VHF and UHF transceivers, but not for the trunked radio systems. Only trunked radio information can be programmed into trunked radios. The above municipalities use a Motorola trunked system. What are these "Motorola Communications Systems" reportedly used by the FBI? The trunking software, which Mr. Leonard is charged with possessing, will not work on traditional VHF/UHF radio systems. It only works on trunked systems. Did the FBI inadvertently answer my question, "Where have all these agencies gone?"



■ Don't Buy if You're not a Spy

While we are still in the legal area, here is another news brief from the *Miami Herald*: "Spy Shops Owner Gets 3 Years In Prison"...

The owner of a chain of stores, that federal authorities said illegally sold electronic listening devices concealed in such things as beepers and light bulbs, was sentenced to three years in federal prison.

John Demeter was one of five people convicted after a 1994 federal sting against his Spy Shops International, which had three stores in Florida. He was also fined \$100,000 and ordered deported to Canada for illegally importing the devices from Japan.

Prosecutors said some of the equipment was sold to a federal agent who posed as a Russian. He also allegedly showed this "Russian" how to tap a telephone.

At his trial, Mr. Demeter said some of his best customers were people who identified themselves as known federal agents who purchased electronic eavesdropping equipment for themselves—"for their own use."

■ Antenna Tip-Offs

When President Clinton was in Miami recently, I took the opportunity to go down and see the motorcade. I am always looking for new antennas which crop up on the back of the Presidential limousine. There were a couple of trucks in the procession which interested me.

The first truck (see photo), is a Ford van. It carries federal government license plates. It also carries a whole lot of communications antennas. This van is operated by the White House Communications Agency (WHCA). We have discussed WHCA in the past few issues when we discussed the monitoring of the 167.075 MHz paging channel.

Most of the antennas are VHF/UHF and can probably be matched up to known Secret Service frequencies. There are a couple of antennas on this van, and others, that cannot be matched up. All of these vans carry high frequency verticals mounted on the rear bumper. This is obviously for some shortwave equipment within the vans (Nightwatch perhaps?).

The other antenna is in the center of the Ford



Antennas of all descriptions are visible on this WHCA van. Note especially the bubble ...

van. It is a black plastic dome affixed to the top of the vehicle. In reality, the top of the vehicle has been cut out and the plastic dome attached. Under this dome is a small antenna 7-10 inches in diameter. This is part of the Defense Communications Agency satellite network known as Milstar. It is an SHF system (Super High Frequency). It transmits to a geostationary satellite in the 30 GHz range (uplink) and receives information back in the 20 GHz range (downlink).

(For some this may be a new term. GHz stands for Gigahertz. It means thousands of megacycles. The Ku satellite dishes are 14/12 GHz—likewise for the direct satellite broadcasts.)

This is a super secure system which carries National Command Authority traffic and anything else related to Presidential communications. The signal is spread-spectrum. If you examine the uplink, or even the downlink, on a spectrum analyzer, you will not see any carrier signal present. It is there: It is just spread out over many thousands of megacycles. It is also heavily encrypted.

There is a GPS receiver on board which pinpoints the van's location at all times, so the parabolic antenna can keep looking at the satellite. The antenna looks like a large metal ash-tray—but is a lot more expensive.

If you examine a photo of the 747 aircraft that carries the President, there is a similar plastic hump on top of the aircraft. It is the same system.

WHCA brought in a satellite system a couple of days before the arrival of the President. It is sort of difficult to tell from the telephoto photos which frequency range they are operating on. C-band is obviously out. The next band the government uses heavily (and practically no one monitors), is the 8/7 GHz band: 8 GHz up to the bird, 7 GHz coming down. The military

is a heavy user of this band. This is the Defense Communications Satellite System or DSCS.

There is also a lot of traffic on the Ku-band. The Treasury Department has a small Ku dish at almost every Secret Service office. This system uses one of the commercial Ku-band birds, probably in the SBS-5 or GSTAR-2 satellites located at 123/125 degrees West respectively.

This dish that was brought in by WHCA has shrouding around the antenna feed horn elements, which prevents one from obtaining a good look at the feed horn. My best guess is that it is in the Ku or the SHF (30/20 GHz) range. Just looking at the tilt of the dish off of vertical, based on the coordinates of Miami, Florida, seems to indicate that this system is looking at the FleetSatcom 7 satellite, which is located at 100 degrees West. This is the primary UHF military satellite for the continental United States. This satellite operates in the following bands:

P-band-----225-1000 MHz
S-band-----1.8-2.7 GHz
X-band-----7.25-8.4 GHz
K-band-----15.4-27.5 GHz

By just looking at the shape of the parabolic dish and the dimensions of the system, I would place my money on either the X- or K-band as its operating system.

■ Reader Exchange

Let's look at a few frequency submissions this month. From a person who wishes to re-



Ku or SHF band? The shroud on this WHCA dish keeps you guessing...

main anonymous—because he works near there—is the trunked radio system for *Kingsbay Submarine Base*.

406.35/415.15	406.75/414.75	407.15/415.95
407.55/415.55	407.95/416.75	408.35/416.35
408.75/417.55	409.15/417.15	409.55/418.35
409.95/417.95		

He also suspects the following frequencies to be a part of the above trunking system, but has not confirmed them:

410.35	410.75	411.45	411.85	412.25
412.65	412.90	417.75	418.05	418.35
418.75	419.15			

Peter, from Massachusetts, sent in the following intercepts from the *Boston area*:

163.7750	Immigration Service Jail repeater output
170.3500	West Roxbury Veterans Administration Hospital Security
171.5000	Jamaica Plain Veterans Administration Hospital Security repeater out
172.0250	Bedford Veterans Administration Hospital Security repeater out
418.3000	Postal Service Security Police Springfield, MA (Not Postal Inspectors)

I had a few submissions from rain soaked California. During the winter floods and mudslides in California, the *Sequoia National Forest* ran a record amount of traffic on its systems. They were using 168.675 and 168.775 MHz. *Sequoia National Park* was found on 164.750 MHz and the *Sierra National Forest* was on 172.225 and 171.475 MHz.

The *Inyo National Forest* operates on the following frequencies:

168.1250	Forestry Net—repeater out and simplex
168.3500	Interagency common simplex
170.5250	Administrative traffic
171.5000	Service Net

The *Toiyabe National Forest* uses the following:

166.2625	Bureau of Land Management (BLM)—Ranger Net Tac 4
166.3750	BLM—tactical
166.4875	BLM—Bishop
169.8750	Forestry Net
169.9750	Administrative traffic
169.9000	Service Net 1
170.1000	Death Valley National Park
170.5500	Service Net 2
171.1500	Devil's Postpile National Monument
172.5750	BLM Ridgecrest—Ranger Net 3

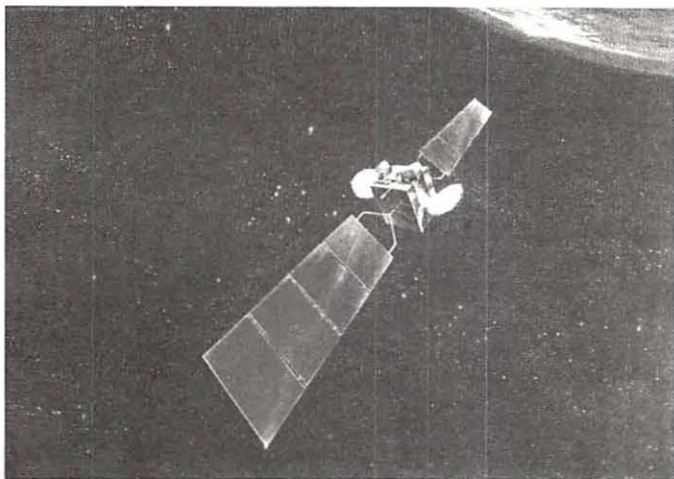
The *U.S. Geological Service* uses the following:

164.4750	Mobile on Monmouth Mountain
169.8250	Repeater out—Mono County
169.8250	Geological Service link from Menlo Park to Mt. Hamilton
408.6250	Link to San Jose (Mt. Hamilton)

Birth and Death of a Satellite; DBS Update

SATELLITE TV ADVENTURES IN THE CLARKE BELT

Ken Reitz, KS4ZR



AT&T's Telstar 401 died a sudden death only three years into its 12-year expected lifespan. (Courtesy Martin Marietta)

AlphaStar offers the same package of 30 DMX audio channels as does Primestar and many cable companies. In addition, customers may order a separate DMX receiver (which features the DMX exclusive DMX-DJ, an infrared remote control with LCD display showing information on music being played), and pay an additional monthly charge, to get the full 83 channel line-up mentioned before.

Meanwhile, after its first nine months of service, the DISH Network claimed over 350,000 subscribers, picking up 65,000 in the last month of 1996. DISH offers a similar 30 channel audio line-up to Primestar. AlphaStar, and cable, charging \$1 per month extra for the service. DirectTV also offers an impressive line-up of CD audio services. The source for their programming is cable audio provider Music Choice [see DBS and DISH line-ups].

In the early days of satellite TV, audio subscribers were an afterthought, a value-added product which cable companies offered usually for free. The many subcarriers on C-band (KLON-FM, BBC World Service, WSM-AM, etc.) are there for cable distribution. There were many attempts in the past to offer analog stereo, commercial-free, music services to the cable industry but all were short-lived. The current attempt, Jones Intercable's SuperAudio is not commercial-free and limited to seven mainstream channels.

It wasn't until DMX and Music Choice, both digitally delivered, became available that there was finally a serious attempt at broadcasting niche audio formats in CD quality. It also made possible addressability, in which the

line-up] While this line-up looks impressive it's not as good as it could be. What Primestar is offering is the same package DMX makes available to cable systems (via their C-band data stream on Satcom F3, 24), but it's a mere shadow of the actual 83 channel line-up available from DMX through its DMX Direct for business and TVRO customers.

Late DBS starter AlphaStar is beginning to pick up momentum. The service stalled in the starting block as plans for distribution via the Army dematerialized. Launched in July of last year, by September it had garnered only 8,000 subscribers (this at a time when Primestar was signing up over 60,000 per month and DSS 80,000). It picked up 15,000 subs in December.

The medium power Ku-band service is pinning its future success on the launch of Telstar 5. Telstar 5 is to launch next month and assume its slot at 97 degrees west. AlphaStar will migrate from its current berth on T402 (Ku-band) to Telstar 5 in July. They hope to grow from current 18 channels to 24 allowing 200 channels of video and audio services.

The demise of T401, owners of T401, as to the cause of its malfunction has yet to be distributed as of this writing. The demise of T401 came without warning on January 11, and may be loosely connected to a cosmic event involving a massive solar flux eruption. T401 was launched December 15, 1993, aboard an Atlas-Centaur 2A5 rocket from Cape Canaveral (see *Satellite Times* March/April 1995 *Birth of a Satellite*) and had been operating for just over three years of its expected 12 year lifetime. The bird was a Martin Marietta Astro Series 7000 configured for 24 C-band and 24 Ku-band transponders. Among its primary customers were PBS, ABC, FOX, UPN, syndicated feeds and two adult movie channels. Ironically, just after the event no reference could be found that anything had actually occurred except for a reference on the homepage of one of the adult services.

Within hours of the loss of T401 all of the customers were re-located to various other satellites and there was a return to schedule with a very small amount of confusion. Some customers have contracts which stipulate that a berth on T402 will be granted them in the event of a disaster. One thing this accident demonstrates is that excess C-band capacity is great enough to avoid actual panic (indeed, even with all customers re-located, there is still excess capacity, as seen by the continual advertisement of C-band availability on GE-1).

It's expected that the FCC will allow AT&T to move its aging Telstar 302 bird to 401's orbital slot at 97 degrees West. Telstar 302 was basically retired, carrying only occasional video from ABC. Telstar 5 will replace 302 following its successful launch in May of this year.

Primestar is Born Again

On January 30 GE-2 rode to space aboard an Ariane 44L rocket from Kourou in the South American nation of French Guiana. This, too, is a Martin Marietta product, an A2100 satellite.

Ariane 44L rocket from Kourou in the South American nation of French Guiana. This, too, is a Martin Marietta product, an A2100 satellite.

broadcaster controls who listens by authorizing those addresses who decide to subscribe and de-authorizing those which don't.

It was the emergence of digital technology that made it possible to cram a hundred or so stereo channels on one satellite transponder to give listeners a choice of programming unheard of in the radio broadcast world. In a few months I'll do a complete review of the DMX stand-alone Ku-band service.

■ DSS Gets Channel Earth

DSS recently sent a press release around trumpeting Channel Earth as "...the world's first news and information channel devoted exclusively to the needs of farmers, ranchers and other rural Americans..." This would not be worth noting, except that they are wrong by nine years.

RFD-TV first launched on C-band in August of 1988 and served America's farmland with programming designed for rural Americans. In the morning, programming featured weather and crop reports, livestock and futures market reports, and other fare of interest to farmers. During the daytime they ran old black and white cowboy movies (now seen on Starz Western channel). The service, which was not scrambled and enjoyed little promotion to the cable industry, was advertiser supported. RFD-TV lasted about a year and succumbed due to lack of advertisers.

Total DSS subscribers are 2.3 million, or roughly the equivalent to the C-band subscription universe. There are said to be anywhere from a half million to one million non-subscribing, functioning C-band systems in use, in addition to the 2.2 million subscribing systems. Total "Direct-To-Home" subscribers are just below the 7 million mark. Total number of cable-TV subscribers in the U.S. are around 65 million.

■ Headend-In-The-Sky

Originally conceived as a one-stop programming supplier to the cable-TV industry, Headend-In-The-Sky (HITS) uses most of the Ku-band side of Galaxy 7 to transmit typical cable channel line-up. The DigicipherII transmissions require the use of a General Instrument DigicipherII receiver (one for each channel downlinked).

One of the reasons for cable systems to try to expand their current channel line-up without having to re-build the system, is to cash in on lucrative Impulse-Pay-Per-View services. On C-band TVN (TheaterVision) has been making a great deal of money for many years off the nine "theaters" they have on Galaxy 3. Similarly, all the DBS services offer many IPPV

Primestar's New Audio Line-up (*indicates additional service)

Lite Jazz
Classic Rock
70's Oldies
Adult Contemporary
Hottest Hits
Modern Country
Traditional Blues
Salsa
Symphonic*
Bluegrass*
Children's*
Christian Inspirational*
Gospel*
Contemporary Christian*
Alternative Rock*
80's Oldies*
Album Rock*
Contemporary Instrumentals*
Soft Hits*
Traditional Country*
Classic Jazz*
Lite Classical*
Folk Music*
60's Oldies*
Big Band/Swing*
50's Oldies*
Motor City Sound*
Urban Adult Contemporary*
R & B/ Rap Hits*
Latin Contemporary*

DSS's Music Choice

Hit List
Dance
Rap (NR-Mature)
R & B Hits
Reggae
Blues
Jazz
Lite Jazz

New Age
Eclectic Mix
Alternative Rock (NR-Mature)
Metal (NR-Mature)
Classic Rock
80's Power Hits
70's Power Hits
Solid Gold Oldies
Soft Rock
Today's Country
Country Horizons
Classic Country
Easy Listening
Big Band
Singers & Standards
Show Tunes
Classic Favorites
Classical Masterpieces
Contemporary Christian
For Kids Only
sounds of the Season
Bluegrass
Rocktrax

AlphaStar's DMX Audio Line-up

Symphonic
Chamber Music
Gospel
Light Jazz
Classic Jazz
70's Oldies
Classic Rock
Motor City Sound
Adult Contemporary
Folk Rock
Modern Country
Traditional Country
Tejano
Salsa
Urban Adult Contemporary
Soft Hits
Dance

Reggae
60's Oldies
Power Hits
50's Oldies
Jazz Vocal Blends
New Age
Hottest Hits
Album Rock
Heavy Metal
Alternative Rock
Children's
Rap
Traditional Blues

DISH's CD Audio Line-up

Young Country
Country Gold
Country Currents
Jukebox Gold
70's Songbook
Adult Favorites
Adult Contemporary
Album Adult Alternative
Hitline
Classic Rock
Modern Rock
Hard Rock
Hip Hop
Urban Beat
Latin Styles
Fiesta Mexicana
EuroStyle
Mainstream Jazz
Contemporary Jazz Flavors
Expressions
Contemporary Instrumentals
Symphonic Classical
Light Classical
Beautiful Music
Mature Vocals
Contemporary Christian
Children's

channels, usually at \$3 to \$5 per movie. Incidentally, the entire Ku-band side of Galaxy 3 is allocated to the Hispanic DBS service Galaxy Latin America which is not available in the United States. It's not clear yet if HITS will eventually be offered to TVRO subscribers.

And, speaking of DigicipherII, The International Channel (G7.24) has gone to that format in an effort to multiplex several full-time ethnic feeds on the same transponder. Previously, they were able to run only parts of some programming which now can have their own channel, thanks to digital compression. Expect TV5/USA (French), Chinese, Arabic, and Filipino channels to have separate feeds.

The service will be available to the home market via GI's new 4DTV receiver which should be on the retail shelves by the time you read this. Worship Channel and Viewer's Choice (a Pay-Per-View service) have also gone DigicipherII.

■ Other Channel Updates

WWOR, New York, is now on Spacenet 4, 14; Animal Planet is now where WWOR used

to be; Fox Sports West 2 is on C1.21; Gospel Music network is on GE-1, 12; Video Catalog Channel is on G6.7; America's Collectibles Network is on Spacenet 3 channels 18 and 22; Romance Classics (an off-shoot of American Movie Classics) is on G7, 12.

KEEP YOUR C-BAND SYSTEM RUNNING STRONG!

Free Buyer's Guide

BEST VALUES ON...

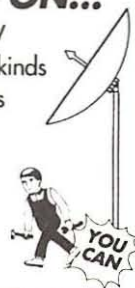
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Squelch Improvement

This cool "hack" was inspired by a novel circuit I spotted in the Realistic™ PRO-2006 after it came out in May 1991. The PRO-2006, a virtual clone of its predecessors, the PRO-2004 and PRO-2005, appeared with a CMOS electronic switch, similar to the 4066 in the squelch circuit of IC2, a TK-10420. The "contacts" of this CMOS switch (IC-10) are wired in series with R-152 33,000 ohms (33k) located between pins 12 and 14 of IC2 to provide a subtle, but important improvement to the squelch operation.

This enhancement appears only in the PRO-2006, but, oddly, was not carried forward into the newer PRO-2035 and PRO-2042. It has never appeared in any other receivers of which I am aware. Figure 1 is a simplified diagram of this enhanced squelch circuit.

The amount of allowable "slop" in receiver squelch has long been a matter of debate. Tune a frequency with no signals, set the squelch for silence, then back it off until squelch breaks and static comes in. The amount of "backing off" before squelch breaks is technically called **hysteresis**, but colloquially, it's just plain old slop.

About 1/8-1/16 inch of slop is good. Too much is aggravating, and possibly degrades performance if squelch doesn't break on weaker signals. Too little, and squelch can get erratic, sometimes not resetting after a signal goes away; often motorboating (rattatatta-tat-tat) while signals are present. Hysteresis is a critical design parameter, but designers make it simple, probably for cost reasons. That simplicity is usually a heavy compromise against variances in the manufacturing process.

The stock-in-trade fix or mod for sloppy squelch was to replace the hysteresis resistor (See figure 1, R-152) with a higher value of resistance, typically a trimmer pot of about 200k ohms to allow

preferred settings. Otherwise, about double the value of the existing resistor produced a better squelch, albeit with side effects. The PRO-2006 is the only scanner of which I am aware that optimized squelch hysteresis! A resistor alone, regardless of size, is not optimal.

■ The PRO-2006 Innovation

IC-10, a TC4S66F in the PRO-2006, is a single section version of the common 4066

quad bilateral switch. This solid state switch is triggered on and off by the scanner's CPU. In short, without getting too "techie," when the receiver is squelched, IC-10 opens to make the squelch very tight and ready to break on the weakest signal. The instant squelch breaks, IC-10 closes, increasing slop to keep squelch from easily closing. In short, IC-10 provides a "smart squelch" that opens at the slightest provocation, but is reluctant to close thereafter. Never mind how this comes across—false hits are not increased; squelch just works better!

The PRO-2006's IC-10 circuit is the basis of this powerful squelch mod, where we'll use a 4066 to emulate the solution to "loose squelch" for many other scanners. This modification is intrinsically applicable to the PRO-2004, PRO-2005, PRO-2035, and PRO-2042 scanners, and readily adaptable to many more (see Table 1).

By inserting a 4066 switch in series with the hysteresis resistor in your scanner, you let the CPU trigger the switch. Chips and components vary from one scanner to the next, but many squelch circuits are exactly like Figure 1 without IC-10 and with the left end of the R-152 equivalent connected directly to pin 14 of the NFM chip.

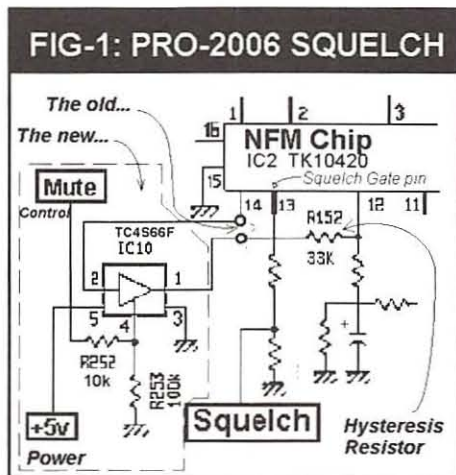
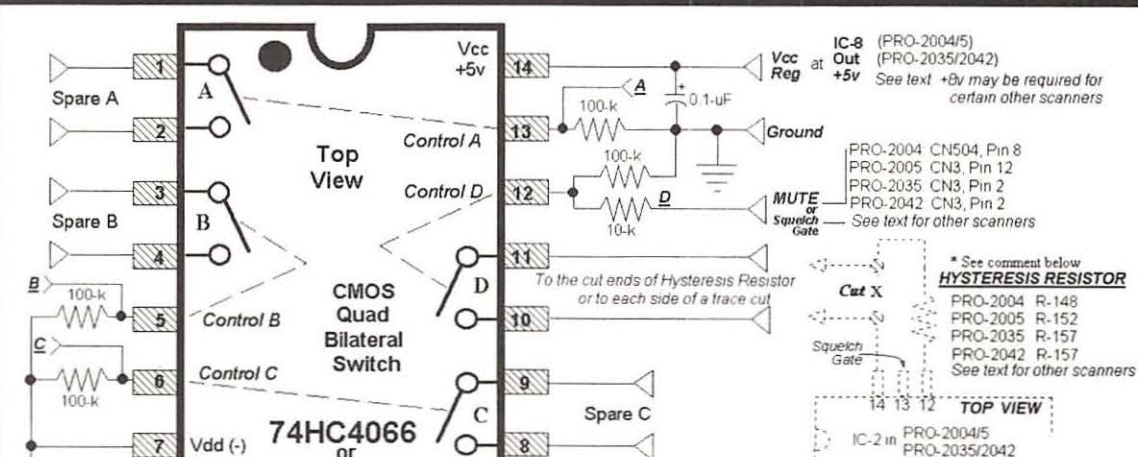


FIG-2: PRO-2004/5/2035/2042 (& others) SQUELCH IMPROVEMENT



- NOTES 1. Switches are open when their control pins are 0-volts or "low". Switches are closed when control pins are "high".
2. Voltage on either switch "contact" must not exceed Vcc volts plus 0.5v and current through the "contacts" must not exceed 25-ma, max. Voltage drop across "contacts" must not exceed 1.2v, max.

* The Hysteresis Resistor in the PRO-2004 has leads, so clip the exposed one near the top and solder wires to the cut ends. Other scanners may use a chip resistor. If so, slit or cut the PCB trace between it and Pin 14 of the IC. Solder wires to convenient pads on each side of the trace cut.

PARTS LIST

Resistor: 4 ea 100-k, 1/4-watt RS#271-1347
Resistor: 1 ea 10-k, 1/4-watt RS#271-1335
Capacitor: 1 ea 0.1-μF/50v RS#272-109
Integrated Ckt: 1 ea 74HC4066 or CD4066 (DigiKey, Mouser, etc)
Perfboard: RS# 276-1395

Compatibility

This mod is compatible with scanners that have a hysteresis resistor between pins 12 and 14 on the NFM chip, and where pin 13 is the squelch gate. Compatible NFM chips include TK10420, MC3361, MC3359, MC3357, and TK10427. There may be others. This mod probably won't work for Uniden and Radio Shack scanners that are made by Uniden, even if they use the above chips.

Table 1 shows the scanners for which this mod is known or suspected to be compatible. Also shown are the different types of NFM chips. The hysteresis resistor will be between pins 12-14, and the squelch gate at pin 13, regardless of the chip.

Figure 2 is the schematic diagram with copious notes to facilitate installation. Figures 3 and

FIG-3: COMPONENT SIDE LAYOUT

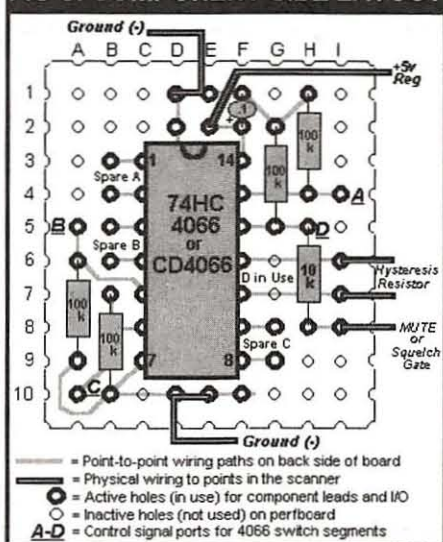
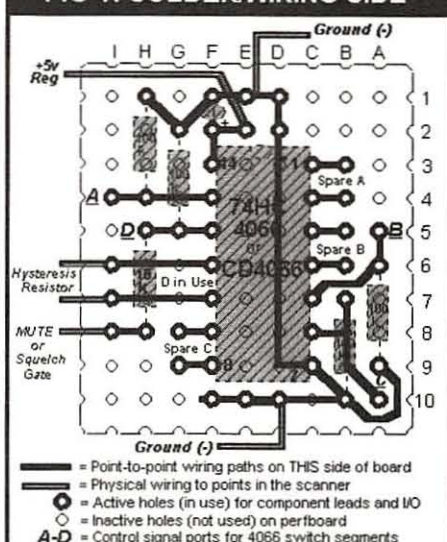


FIG-4: SOLDER/WIRING SIDE



4 show how to build the simple circuit on a piece of perfboard. Connection and hookup are not critical. The primary consideration is where to make the connections. In all cases, the path between the hysteresis resistor and pin 14 must be cut and the "contacts" of the 4066 switch wired to each side of the "cut."

If the hysteresis resistor has leads, then cut an exposed lead and solder the 4066 "contacts" to the cut ends. In most cases, the hysteresis resistor will be a tiny chip resistor; slit the PCB trace between that resistor and pin 14 of the NFM chip. Find pads on either side of the cut to solder the wires from the 4066 switch. If necessary, one of the wires can be soldered directly to pin 14 of the IC (it's rugged). Just don't let a solder-blob get between adjacent pins.

If the scanner is a PRO-2004, 2005, 2035, or 2042, the control pin of the 4066 switch must go to the scanner's mute function (see Figure-2). For all other compatible scanners, it must go to the "squelch gate" pin 13 of the NFM chip.

The (-) ground of the 4066 board should be connected via an 18-gauge solid wire to the chassis of the scanner, either by nut/bolt mechanical means or by direct soldering. This makes a functional mount, too. DC power (+Vcc) should be a source of regulated +5v in the scanner (Out lug of IC-8 in the PRO-2004/5/2035/2042; see caveats).

Caveats

1. Do not perform this or any squelch mod to the PRO-2006!
2. AOR and Regency scanners listed in Table 1 may or may not be compatible with this mod. Verify the hysteresis resistor and squelch gate (use a voltmeter while setting and breaking squelch) at NFM pin 13.
3. Squelch gate at Pin 13 of the NFM chip is always 0-volts (low) when squelch is set, and +Vcc (high) when squelch breaks.

4. If the squelch gate (high) at NFM pin 13 is greater than +6v, the 4066 circuit must be powered from +8v. Most scanners use +5v logic at pin 13, but verify first!

5. The PRO-2004/5/2035/2042 use +8v logic at IC2, pin 13, but since we use the +5v mute to trigger or control the 4066, the +Vcc DC must be +5v. (See Fig-2.) This mod for these four scanners doesn't use NFM pin 13. All other scanners probably will use it!

6. Handheld scanners have almost no "real estate" for extra boards. Try building the circuit "dead bug" style, with the chip glued upside down in an open area. Solder the parts and wires directly to the pins of the chip. Use tiny 1/8 or 1/10 watt resistors to conserve space.

Freebies

The 4066 board has three spare switch contacts! So long as you abide by the Note 2 in Figure-2, you can use these three spares for anything you like. Build your board so that the spare control pins and contacts are readily accessible, (pinline plugs and sockets), and they'll be available for all sorts of switching needs! (See Note 1 in Figure-2.) Sections A, B, and C are shown as spares while Section D is used for the squelch mod.

Tech support for this and all my articles is freely available by e-mail. If you inquire about compatible radios, it will probably be mandatory that you first have a service manual. Here are the numbers to call to get one: Radio Shack 800-442-2425; Uniden 317-842-1036; AOR 800-368-3270.

E-mail: bcheek@cts.com
WWW: http://ourworld.compuserve.com/homepages/bcheek
FTP: ftp://ftp.cts.com/pub/bcheek
BBS & FAX: (619) 578-9247 5:30 p.m.-1:30 p.m. PDT

TABLE 1
SCANNERS & CHIPS

SCANNER	NFM CHIP TYPE	CKT SYM
various	MP55071	various
AR-2002	MC-3357P	IC-4
AR-3000	MC-3357P	?
AR-800	MC-3361N	IC-200
AR-900	MC-3361N	IC-201
AR-950	MC-3361N	IC-201
HX-1000	TK-10420	U-201
MK-5000	MC-3357P	IC-4
MK-7000	MC-3357P	IC-4
PRO-2002	MC-3357P	IC-101
PRO-2003	MC-3357P	IC-104
PRO-2004	TK-10420	IC-2
PRO-2005	TK-10420	IC-2
PRO-2006	TK-10420	IC-2 *
PRO-2011	TK-10420	IC-1
PRO-2020	MC-3357P	IC-101
PRO-2021	TK-10420	IC-2
PRO-2022	MC-3361N	IC-1
PRO-2024	MC-3361N	IC-2
PRO-2027	MC-3361N	IC-2
PRO-2035	TK-10420	IC-2
PRO-2042	TK-10420	IC-2
PRO-23	MC-3361BD	IC-1
PRO-31	TK-10420	IC-1
PRO-32	TK-10420	IC-101
PRO-34	TK-10420	IC-101
PRO-36	TK-10420	IC-101
PRO-37	TK-10420	IC-101
PRO-39	MC-3361N	IC-201
PRO-42	MC-3361N	IC-2
PRO-43	TK-10427 or TK10420	IC-301 IC-301
PRO-44	MC-3361N	IC-201
PRO-51	MC-3361BD	IC-1
PRO-62	MC3361N or KA3361N	IC-301 IC-301

*Reference only; mod not applicable

Bones or Bargain?

A wise old saying advises that you cannot make chicken salad from chicken ___, er, shall we say, *bones*. Not quite verbatim, but I'm sure you get the message. On the other hand, my mother-in-law used to say, "Any fool can pay full price." I must confess that I agree with her wholeheartedly. We seem to be in a culture that sets values by the price we pay. Higher price must be better, right?

Call it perverse, but I take more pleasure in hunting down quality, sometimes outdated, radio equipment and computers at give-away prices—for example, the three Compaq Portable III computers I bought at a hamfest last fall for \$30. No, not each; for all three. To the seller, these \$10 computers seemed as useful as chicken "bones."



How can we use the ten year old, 286, 12 MHz, plasma screen computer shown in Figure 1? Let's see. Although the Compaqs have 40 Megabyte hard drives, they only came with 640k of RAM. Remember the days when that was the standard? Circa 1987. That was before Bill Gates impressed Windows 3.1 on the world. The non-standard memory type and arrangement used by Compaq makes memory expansion relatively expensive. Therefore, as they stand, we can only use the Compaqs to run DOS applications.

So, for several months they just sat under my computer desk, taunting me to come up with a use. This Compaq model is unique in that it has a box which fits on the back which allows you to add full size PC expansion boards. This feature is not available on the 386 laptops in my collection nor the 486 IBM ThinkPad. (See where we're going?)

In a past column, while reviewing a new product, I commented that using that product in a DOS environment would be very difficult. The product was Rosetta Lab's very fine WinRadio, a computer-controlled receiver which covers 0.5 to 1,300 MHz. All major modes are included: AM, FM narrow, FM wide, and SSB. The whole receiver is housed on a PC expansion board that plugs into a 16-bit slot.

Hm-m-m, wouldn't it be nice to have a 0.5 to 1,300 MHz receiver inside a portable computer! Mediumwave, shortwave, VHF low, commercial FM, VHF-high, and UHF—that would make a nifty all purpose receiver. Could we have found a purpose for the Compaqs?

But wait. It's called WinRadio for a reason. As we found out in the past review of WinRadio it did indeed work quite well in Windows 3.1 using a 386 and 1 Megabyte of RAM as a minimum. In Windows a graphical depiction of a receiver gives us easy access to all monitoring functions via simple point and click mouse use. But that's in Windows! What can we do in DOS?

Control of WinRadio in DOS is pretty much a type-a-line situation. For example, to set the volume level to half its maximum we have to type "DOSRADIO V15". The V indicates that we wish to control volume. The 15 is the level out of a maximum of 31. To set the frequency we replace the V15 with Fxxxxxxx, where the xxxxxxx represents the frequency we desire in kHz—not very easy

to tune and use, to say the least.

But what if there was a little DOS program? A program that would allow us the ability to display the basic current settings of the receiver and change them via single key strokes? Then we would have converted a \$10 computer into a useful, portable, monitoring tool. Well, with a bit of poking around the WinRadio disk and manual, and some very (and I mean *very*) simple batch file rewording, it may be a reality. I heard you say it, "Can the cheapskate do it with a \$10 computer?" Let's see.

■ Teaching Old DOS New Tricks

If we want to program in C or C++, page 141 of the WinRadio manual is a good starting point. However, I must confess that the last thing I want to do today is start programming. Hey, we started off to have some simple fun! And why reinvent the wheel, when it's already been done? Rosetta Labs included a program called **wr.exe** on the WinRadio disk. This program allows us to control the basic functions of WinRadio from single key-strokes. Figure 2 is the only screen which appears when wr.exe is run, and all the key-strokes are listed on the screen.

Manual receiver control in DOS is that easy. Operation is as simple as it sounds. Frequency, Mode, Volume, and Sensitivity are at the control of a \$10 golden oldie computer. Even the beat frequency oscillator (BFO), used when receiving single sideband signals (SSB), is key controllable. OK, so the

DOSRadio usage:

```
F1:      Set frequency
F2:      Change mode
F3:      Local/DX
F8:      Mute audio (any other key restores audio)
Esc:     Exit
Left cursor: Decrease volume
Right cursor: Increase volume
Up cursor: Increase frequency by 1 kHz
Down cursor: Decrease frequency by 1 kHz
Insert:   Increase frequency by 5 kHz
Delete:   Decrease frequency by 5 kHz
Home:     Increase frequency by 10 kHz
End:      Decrease frequency by 10 kHz
Page Up:  Increase frequency by 30 kHz
Page Down: Decrease frequency by 30 kHz
+         Increase BFO frequency
-         Decrease BFO frequency
```

WinRadio for DOS (v1.01) - Copyright (c) 1995, Rosetta Laboratories, Pty. Ltd.
Frequency: 105900 kHz Mode: FMW Volume: 15 Sensitivity: DX


```
JCSCAN1.BAT 4% Ins Ind Tab:8 Row:1 Col:1 Chr:64 KB:0 00:06
echo off
echo "Usage: scan i<step size> <sensitivity> [other WinRadio parameters]"
ECHO.
dosradio on %3 %4 %5 %6 %7 %8 %9
rem *** setup WinRadio for scanning by pre-initializing (optional)
:loop
dosradio %1
rem *** increment frequency (first parameter - c[freq])
CLS
DOSRADIO S
ECHO STEP SET TO 1% KHz
ECHO SENSITIVITY SET TO %2 RANGE (0-100) 100=HIGH SIGNAL
if not errorlevel %2 goto loop
rem *** check to see if signal level was greater than the second parameter
rem *** if not, goto loop.
dosradio
ECHO.
rem *** show final WinRadio status.
echo.
choice /c:yn /n Continue scanning?
if not errorlevel 2 goto loop
echo.
echo Finished scanning!
F1Chart F2PrtBF F3DelBL F4CseBL F5WriteBF6ReadB F7JstBL F8SftBL F9TabBL F10Disp
```

memory channel function is missing. But with this exception, it operates like a traditional shortwave, desk receiver. The use of a coaxial-fed, outside antenna is a MUST with all the computer generated clock signals running around. The supplied antenna works well if it is mounted outside and as far away from the computer as possible.

■ But Can It Scan?

In order to use any VHF/UHF receiver, scanning between two frequencies is almost a necessity. Although a program called **scan.bat** also exists on the WinRadio disk, it misses the useful mark. It is written as a batch file which makes it limited in its operation, but it is also very easy to modify.

To use the scan.bat file the user types in:

scan I100 50 F162400

The number after the I (100 in this case), is the frequency step in kHz. The sensitivity is set at 50 out of a range of 0 to 100 (You can think of it as a squelch-type setting). The frequency will be incremented by the step (100 kHz) until a signal greater than 50 is found. Then the program stops and asks you if you want to continue scanning or quit. Putting a minus sign in front of the 100 makes the receiver scan downward in frequency. . . It really makes you appreciate your Radio Shack scanner! With all that effort, scan.bat can only run the frequency one way, either up or down. Can we add more sophistication? Let's try.

As it was written, the program adds the step frequency and then checks the frequency for a signal and its strength. If signal strength is greater than the value we typed in, the scan stops and the receiver parameters are displayed. If no signal is present the program "loops" around and adds another step fre-

quency amount to the last frequency. Then the whole process starts again tuning the radio to a higher frequency.

Using the Edit command we can modify the scan.bat file. The resulting batch file, JCSCAN1.bat, Figure 3, has a few changes. First, values we've entered for the step frequency and scan stop signal level are now displayed while we are scanning. Also, the frequency that we are tuned to at the moment is displayed and constantly updated. Alas, the scan rate is a snail's pace of one frequency step per second — a product of our "simple" batch file control approach.

■ Salad or Bones?

Well, to be fair, we are only batting 50 percent. As shortwave receiver our \$10 computer controlled DOS WinRadio is quite useful. With the exception of memory channel storage/recall, it does it all. But as a scanner its use is limited. Either we can use it to crawl over the VHF/UHF spectrum, or we can use it as a single frequency monitor. More software development is required. If you have the ambition to write DOS based software for WinRadio, E-mail it to me so we can share it with everyone.

As we already have seen, the Compaq Portable has two strikes against it in today's Windows world: a 286 slow processor and only 640k of memory. There are quite a number of computers which have the same limitations and therefore can be bought for the price of a video tape. Remember, the features that made the Compaq interesting to me were its portability and its expansion slot capability. Since a plasma screen is part of the cabinet, no heavy, bulky monitor is required.

The expansion slot is necessary to be able

to use WinRadio or other "interesting" PC card appliances. For example, adding a sound spectrum program, we could also have a portable sound spectrum analyzer. Hm-m-m, I should be able to pick up an old sound card for the price of a McDonald's value meal . .

■ Keep the E-mail Coming

We have all benefited from the increasing volume of E-mail you have been sending me. Many of the Web sites mentioned in this column are from your E-mails. Thank you for your kind words about the column. We try to keep it interesting, useful, informative, and entertaining. All this while trying not to "speak geek." So keep those radio web sites coming and we'll keep listing them. Meanwhile, keep your eyes open for your own \$10 computer bargain.

RadioMax Windows scanning

Serious radio control. High resolution graphics let you see and control what's happening in real time. Search, sort, scan by frequency, comments, hit times, modes etc. PC can even speak the frequency / hit time! PerCon file support. Intelligent tape control and delays. Many more features. Call for demo and more information! VISA / M-C

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 6105 SE Nowata Road Unit 6, Bartlesville
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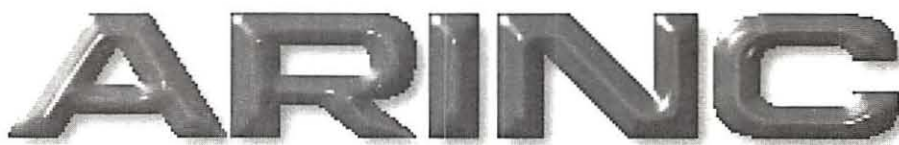
The NXL-250A: PICKS UP STATIONS LIKE AN OUTDOOR ANTENNA AND SOLVES YOUR NOISE PROBLEMS TOO!

The NXL-250A uses a special shielded noise-cancelling loop which cuts local noise interference such as power-line buzz, computer and TV hash, etc. Its internal high-gain amplifier and sharp tuning combine with the loop to give you higher signal-pulling sensitivity than any other indoor active antenna! Covers 540 kHz to 30 MHz. With the high-sensitivity 20-in. loop, it's only \$127.95, or with the compact 12-in. loop, it's only \$117.90, ppd! (Specify radio model for proper output adapter.). Avail. options: Automatic internal antenna switch: \$20.00. High sens. MW loop (500-1700 kHz): \$84.95. AC adapter: \$9.95. Order an NXL-250A today! To get our catalog, send a 32 cent stamp.

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ARINC's New Technologies

What's New in ACARS



The Aircraft Communications Addressing and Reporting System (ACARS) is a VHF air-to-ground data link that routes messages between a specific aircraft and a ground processing facility. Implemented in 1978, ACARS is used by major U.S. and international airlines, regional airlines, corporate aircraft, and government agencies to assist in the efficient operational control of aircraft by both flight operations and air traffic services facilities.

Today, over 4,500 aircraft transmit and receive more than 8.85 million messages per month via Aeronautical Radio Inc. (ARINC) ACARS. Although originally designed as a VHF system, ACARS now also utilizes both satellite and HF modes as well.

■ ACARS Signal Characteristics

The ACARS signal is comprised of a 2400 Baud message databit stream to differentially AM modulate the transmitter carrier using 1200 and 2400 Hz tones. A 1200 Hz tone indicates a bit change from the preceding bit, while a 2400 Hz tone indicates no bit change.

AM modulation, used for airband VHF voice communications, is also used for ACARS transmissions. Unlike FM, AM signals are not subject to Doppler Effect, nor does a stronger signal mute weaker ones.

ACARS message frames consists of a minimum of 50 to a maximum of 272 characters or bytes. Characters use a 7 bit ASCII code with an additional eighth bit parity. Message transmission duration typically lasts between 0.17 and 0.91 seconds. Because of this short time factor, the squelch control on your scanner/receiver should be in the off or "squelch open" position.

■ ACARS Components

Three major elements comprise the ACARS Network.

1. The Airborne Subsystem (onboard the aircraft), which consists of the Management and Control units.
2. The ARINC Ground System, consisting of the ACARS VHF Remote Networks, the ACARS Front-end Processor System (AFEPS) and the ARINC Electronic Switching System (ESS).

3. The Air Carrier C2 (Command and Control) and Management Subsystems which include ground-based flight operations, maintenance centers, dispatch offices, etc., of the various airline carriers who are ACARS-equipped.

■ Airborne Subsystem Configuration

Management Unit (MU): The Airborne Subsystem Management Unit (MU) receives ground-to air messages from the radio transceiver to which it is connected and controls the transmission of air-to-ground digital messages through the same device. It is capable of operation in two modes. During Demand Mode, it transmits messages when the need arises and when it determines that the ACARS RF channel is free of traffic; in Polled Mode, it transmits only in response to a message (poll) from the ground station that is addressed to the specific aircraft (the procedure is similar to that of Selective Call Paging).

The MU gathers data for transmissions to the ground station from the Airborne Subsystem Control Unit (CU) and the Event Sensors on the aircraft (used for automatic Out, Off, On and In time reporting — known as OOOI). An additional message source may also be provided through an Optional Auxiliary Terminal (OAT).

Event Recording: OFF and ON events are typically recorded through sensors in the aircraft's landing gear. IN and OUT Events are usually triggered by the closing or opening of passenger doors, or the release or application of aircraft brakes. Separate Event Sensors are used which automatically record the event condition and the UTC time.

An OUT event normally refers to the time the aircraft is "Off the Gate," or when the aircraft is pushed back by the tug. The term "time off the block" has also been used to describe this procedure — as this is generally the time when the wheel blocks are removed.

Hardware includes an uplink message hard-copy printer located in the cockpit, and an optional auxiliary terminal (OAT), possibly in the form of a CRT/Keyboard device (Video Display Terminal). Additional avionic subsystems may include: Combined Fault Data Indicator Unit (CFDIU); Digital Flight Data Acquisition Recorder (DFDAU); Flight Management Computers (FMC); Passenger Cabin Terminals; Instrumentation Reporting Systems (EICAS, ECAM, EFIS); Satellite Data Unit

■ ARINC Ground Switching System (ADNS)

As one of the largest private message switching systems in the world, the ARINC Data Network Service (ADNS) offered by Communications By PROXY, Inc. (a wholly owned subsidiary of ARINC Incorporated), provides universal connectivity to the air transport industry. Through ADNS, industry participants are able to communicate directly with more than 700 other users and exchange information such as passenger name records, seat availability status (AVS), hotel availability status (AVH), car availability status (AVC), airway bills, aircraft movement, and material management transactions.

In addition, ADNS provides access to commercial services; ARINC-provided information services such as TICKETS, the Universal Air Travel Plan (UATP), and the Dishonored Check Information Exchange Service (DCIES); ARINC's air/ground voice service; Aircraft Communications Addressing and Reporting System (ACARS); and government systems such as the National Airspace Data Interchange Network (NADIN), Communications for the Automated Manifest System (CAMS), and Air Passenger Interface (API).

The ADNS communications system uses completely redundant, modular message-switching systems. Each node has

uninterruptible power, full diagnostic capabilities, and routing diversity for communications links designed to provide nearly 100% reliability and network availability.

Connection to ADNS is made through dedicated links or dial-up. Dedicated access provides the high-volume user with efficient, high-speed access to the network. To support low-volume users, PROXY offers two economical, highly reliable PC access systems.

Communications By

PROXY

An ARINC Company

■ ARINC's HF Data Link Service

November 1, 1995, marked the beginning of ARINC's new GLOBALink/HF service. ARINC's implementation of worldwide HF data link service is based on two customer-driven needs: a cost-effective data link for long-range operations and a backup data link for aircraft with SATCOM.

Many aircraft operators would like to benefit from the capabilities available with a SATCOM data link, but cannot justify the high cost of the associated avionics. By using existing HF avionics and the antenna on the aircraft, operators can have HF data link at a fraction of the cost. Service costs are comparable to SATCOM and well below HF voice costs. Such affordability means operators of classic, cargo, and corporate aircraft can also realize data link benefits.

Another major benefit of GLOBALink/HF is that it can be used in a complementary mode to SATCOM. The two systems use different avionics, antennas, propagation paths, and ground stations. If one system is unavailable, the other system can be used as an alternative. GLOBALink/HF also provides SATCOM equipped aircraft with the benefit of extended data link coverage in the polar regions where SATCOM coverage is minimal and in equatorial regions where SATCOM performance can be degraded by atmospheric phenomena. Aircraft equipped with both HF data link and SATCOM have continuous global data link coverage.

Long-range data link can reduce aircraft operating costs. When the aircraft is outside VHF ACARS range, HF data link can provide the full range of ACARS applications, including engine monitoring, flight following, weather data, ETOPS data, and flight plan uplinks.

GLOBALink/HF allows quick, accurate

transmission of operational data and eliminates the need for crew transcription of voice messages. Trial use customers state that having maintenance data transmitted over GLOBALink/HF allows them to detect and correct aircraft problems, thus avoiding diversions. A single avoided diversion pays for the avionics and service many times over.

Oceanic data links are also a required capability for aircraft to gain many of the benefits associated with CNS/ATM, such as reduced separation, cruise climbs, and preferred routes. GLOBALink/HF is designed to support these air traffic control programs based on ACARS, FANS, and Aeronautical Telecommunications Network (ATN).

The GLOBALink/HF service is being implemented in two phases. The first will use the existing HF data link ground infrastructure in the North Atlantic. In the second phase, ARINC will develop and deploy an HF data link system based on the airline industry standard protocol (ARINC 635). The second-phase system will eventually provide worldwide coverage.

The launch customer for this service is Delta Air Lines, Inc. Delta has equipped and certified 11 of its Boeing 767/300ER aircraft with HF data link avionics that allow it to access the service. Delta has been using the service on a trial basis for the past year. ARINC expects Continental Airlines, Inc., and two other major airlines to begin use this year.

GLOBALink/HF communications stations in the North Atlantic are operated by NewEast Wireless Telecom in Newfoundland, Canada; Iceland Post and Telecom's Gufunes Telecommunication Center; and Stockholm Radio in Sweden. Messages to and from the aircraft are routed through one of these stations. Message processing and radio frequency control are managed at a central site. Processed messages are delivered to airline operations centers and to civil aviation authorities (CAAs) via ARINC and AFTN/CIDIN ground networks.

According to Moira Kelly, System Manager Communication/Navigation, Delta Air Lines, "HF data is effective even when HF voice is degraded. It provides us access to our aircraft in regions of the world that were previously inaccessible. We now use it for direct inputs from the aircraft to our new Flight Planning System and our Flight Following System, providing velocity, wind, temperature, fuel, true airspeed, and other data. This helps our flight planning function immeasurably. We can even upload a whole new flight plan while the aircraft is en route in a remote area. We just can't do that with voice. It's unbelievable."

"Furthermore," adds Kelly, "we have found HFDL to be more robust than satellite, with better availability and integrity. The flight crews greatly prefer data communications to voice."

The HF data link is an aeronautical air/ground packet data network which will allow aircraft to use existing on-board ACARS data management units to send and receive data via a network of HF ground stations. Each ground station will provide service on three or more frequencies simultaneously. To assist with the search for a usable frequency, each HF data link ground station broadcasts system management uplink packets ('squitters') every 32 seconds on three or more active frequencies. Aircraft can measure the quality of each channel and use this info to select and automatically tune to a frequency which will allow error-free transmission with adaptive rates of 150, 300, 600, 1200, and 1800 bps. A network of 9-14 HF data link ground stations will extend the coverage of VHF ACARS networks on a worldwide basis to over-water flights including air routes over the Atlantic, North Pole, S. America, Africa, the Pacific, and Asia.

The following companies are involved in the HF data link project: NewEast Wireless Telecom, Ltd. Newfoundland, Canada; Stockholm Radio, Sweden; Iceland Gufunes Telecommunications Center, Iceland; American Airlines, Delta Airlines, United Airlines, and USAir.

Stockholm Radio has three active frequencies: 4595, 11223 and 8971 kHz. There are also three frequencies for Iceland. The Canadians have six frequencies to support HF Datalink, of which 11183 and 13340 kHz are active. During the trials, the following frequencies were used by the various stations: 12620, 6737, 29800, 13568, 7756, 3862, 20068 kHz. The 6 MHz frequency for Canada was later replaced by a 10 MHz frequency.

Unfortunately, none of the current ACARS decoders are capable of decoding HF ACARS.

Performance Upgrades

JRC NRD 525/535

AOR AR-7030

Sony ICF-2010

Yaesu FRG-100

Lowe HF-150 and AP/SP-150

RS DX-394

Kiwa offers a variety of performance upgrades for the following receivers which include filter modifications to audio enhancements. Contact Kiwa for details or visit our web site for complete information.

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kiwa@wolfe.net (Internet/full catalog)

http://www.wolfe.net/~kiwa

V-Link, Personal Voice-Link System

By Steve Donnell, WA1YKL

One of the latest products to make use of the 902 - 928 MHz band is the V-Link from Yes! Entertainment Corp. TV advertisements for the V-Link appear to be promoting it as a low-cost alternative to cellular phones and pagers for use by teenagers, and as a possible competitor with UHF radios in the new Family Radio Service.

Measuring only: 2.1 x 5.5 x .95 inches, available in several "mod" colors and bearing a very close resemblance to a Motorola "flip-phone," the V-Link actually boils down to being a 900 MHz "kiddie talkie" hand-held transceiver. But it's clearly a lot more sophisticated than the old style 27 MHz (or 49 MHz) Space Patrol radios that were around when many of us were growing up.

The V-Link can operate on 18 different 900 MHz frequencies (see below), which are automatically selected by the V-Link's computer. 916.875 MHz however, seems to be used as its common calling/standby frequency. The V-Link is specified as having a range of "three blocks," but this may be pushing it a bit, as lab measurements indicate the V-Link's transmitter has a power output level of only .2 mW.

What really sets the V-Link apart from other radio "toys" is its more advanced features—one of which includes a digital voice recorder. While it has only 20 seconds of re-



cording time, it can be used as a voice mail system to store multiple messages from folks using their own V-Links to contact you. The voice recorder can also be used to store your own messages for playback later or to other V-Link users.

The V-Link can also function just like a pager in that it can be set to "beep" or even vibrate whenever another V-Link wishes to contact you. It has a fairly advanced digital ID code protocol that allows a V-Link user to selectively contact other V-Links: A user must first program his or her own ID code number in the unit, then select the ID code of another V-Link or use a "wildcard" option to transmit messages to a group of users that have similar ID numbers. The ID code from the V-Link is transmitted as a high-speed data burst. This is heard as a short buzz which is sent at the beginning of a transmission.

We were initially intrigued by one of the V-Link's advertised features: being able to transmit "private" messages to other V-Links. Was this some type of digital scrambling technique? Not exactly. It turned out to be one of the ways that the V-Link uses its other programmable frequencies. When a "private" link is selected, the units are shifted off to one of the other available channels. If the first channel is occu-

pied, then the V-Links shift down to the next one.

All voice communications with the V-Link take place using regular analog FM. However, given its measured frequency deviation (modulation level) of slightly over 25 kHz, to clearly monitor audio from a V-Link will require a scanner that can be set to wideband FM.

The V-Link is available from a number of retail outlets. Ours was bought at local Toys 'R' Us for only \$79.95. The V-Link is powered by a snap-on battery pack that holds four AAA cells. For an extra \$30.00, you can also get a rechargeable NiCd battery pack. Please note that, despite the V-Link name, there is NO connection between the V-Link and that of V-Tech, the company that markets 900 MHz cordless phones.

OPERATING FREQUENCIES FOR THE V-LINK:

903.4875 MHz	910.2375
940.0000	910.9125
904.5000	912.0000
905.1375	913.3375
905.6625	914.0875
906.3375	915.0000
907.0000	915.8625
907.6625	916.8750*
908.5000	* Primary calling standby channel
909.3375	

New Pocket Transceivers From Radio Shack

By Bob Grove, WA4PYQ

The newly-established, UHF (462/467 MHz), Family Radio Service has been receiving a great deal of attention from manufacturers eager to cash in on a new market. Several two-way, handheld radios have emerged, among the newest of which is the FRS-108 from Radio Shack, the company that originated the FRS concept.

Featuring an LCD window showing channel number, key lock status, and battery status, the vest-pocket-size handie-talkie offers 14 channels, autosquelch, and a flip-up flex antenna. Powered by three AA alkaline cells, the 108 puts out 300 milliwatts of power, and claims a maximum one-mile range.

Eager to compare it with established, VHF

high band (150 MHz), business-band handie talkies. I took one each of the two radios and headed out of the office. Sue, my intrepid colleague back at headquarters, had the mating pair of HTs. The UHF units were operating at their rated 300 mW, while the VHF transceivers were set at low power—500 mW, roughly equal.

It soon became evident that the lower frequency radios had a slight edge over the pocket portables, and this



could have been predicted. The longer wavelengths more easily followed the contours of the undulating terrain, and the antennas were longer, intercepting more signal on receive. The 2.2 dB may have made a slight difference as well. The characteristic "picket fence" fluttering at UHF was evident as I walked as well.

But the \$129.95 radio performed well, and is extremely compact, lightweight, and convenient. Battery life is more than 100 hours—and three AA cells aren't expensive. For camping, hiking, car caravans, public events, and other short-range applications, the little FRS-108 is ideal.

WHAT'S NEW?

PRODUCTS AND BOOKS OF INTEREST TO THE RADIO HOBBYIST

by Larry Miller

Guest Reviewers: Rachel Baughn, Bob Grove, Gayle Van Horn, Dan Veeneman

Satellite Telephone



picnic table in the North Carolina woods — the Magellan MicroCom-M puts you in global contact with crystal clear primary or backup communications.

Not only is it easy to use, but it's easy to take with you, too. It's an unbelievable 6.8" x 11.3" x 2.8" and it weighs just 5.5 pounds. The Magellan MicroCOM-M is perfect for contractors, fleet management, rescue operations, paramilitary units, survivalists, missionaries, relief agencies or anyone who needs reliable, instant communications. You can launch your personal or business communications into space with the Magellan MicroCom-M for \$4,999.95. Call Grove Enterprises for more information or to see if this powerful satellite telephone is for you. The number is 704-837-9200 (or 800-438-8155 to order).

A Scanner Fairy Tale

Long ago, in a land far, far, away, there was a manufacturer who had built a small scanner kingdom, named Regency. Though it built many fine radios, it was taken over by the rival kingdom of Uniden. For ten years the name of Regency was banished from the world of scanners. One day, when absolutely no one in the kingdom expected it, a stranger entered the realm. Only it was no stranger; it was Regency, transformed into the RELM. And scanner listeners throughout the land celebrated. The end.

No, kids, this story is no fairy tale. The company that made those Regency scanners during the 1980s has returned with a line of new, multi-band programmable scanners and from what we're hearing, the reviews are all raves. Remember the old Regency HX series? This new line is called the HS.

The first of the new RELM scanners is the handheld HS 200.

It has 200 channels in 10 banks and scans at the lightning fast rate of 100 channels per second. Frequency coverage is 26-54, 118-174, 406-520, 806-960 (minus cellular). What makes the HS200 really hot is that all channels can be keyboard-programmed for PL/CTCSS (subaudible tone) or DPL/DCS (digital) squelch systems. (This does not mean, as has sometimes been misunderstood, that the receiver can be used on a digital 800 trunked system.)

Add to all of this, high sensitivity (0.4 uV), strong audio (400 mW), sharp selectivity (-50 dB), 10 priority channels (with heirarchy!), weather scan, CB coverage, the long-awaited return of the signal strength bargraph, and a street retail price of under \$275.00 (Grove has it for \$249.95) and you've got one hot scanner. If you don't believe me, check out Bob Parnass' review in this issue. You can get your RELM HS200 from virtually any MT advertiser. Check the ads in this issue of *Monitoring Times*.

Talking Radar

Uniden America has unveiled a new 360 degree laser/radar detector. As far as radar detectors go, it does the job. It's also undetectable, says Uniden, featuring the company's new "Stalker Technology" that makes it "immune to all current VG 2 radar detection devices."

Aside from that, what makes



this Uniden radar detector different? It talks to you. The LRD 6599SWS incorporates Uniden's first digital, built-in safety warning system. That means that when you come up on a travel hazard, like a construction site, school zone, traffic jam, approaching train, thick fog, or any one of 64 alert situations, your radar detector will let you know. The '6599SWS also has a signal strength meter, which accurately indicates the strength and distance of the radar being detected.

The LRD 6599SWS is now available in stores and carries a suggested retail price of \$279.95.

Radio Monitoring: The How-To Guide

MT readers will quickly recognize the author of this beginner's guide to scanner and shortwave listening. T.J. "Skip" Arey's easy-to-understand fundamentals of listening to the spectrum have graced the



pages of this magazine for years. Over 300 pages, many of them fully illustrated, cover topics like antennas, equipment and accessories, signal propagation, world time, listening techniques, clubs and organizations, and computers.

Special appendices cover equipment suppliers, publications, the Internet, and the radio spectrum. While it's not without errors (the Grove web site is www.grove.net, *U.S. Scanner News* is now no longer in publication), they are few and the substantive contents of this new work provide an excellent overview of the radio listening hobby and is recommended for the newcomer to the hobby.

Radio Monitoring is printed

Bob Grove set up the Magellan MicroCom-M satellite telephone on an old picnic bench in the middle of the North Carolina woods. The thing is remarkably easy to get going. You turn the unit on, unfold the two panels that act as the antenna, and point it at the nearest satellite. (You know when you're on target by watching the LED light bar.) All that's left to do is to pick up the handset and dial!

Bob carefully punched in the number: 1-704-837-9200. There was a short pause and then Bob's phone call shot upward at the speed of light, one thousand miles into space to the awaiting INMARSAT satellite. From there it was shot back to earth where it was picked up by a receiving station and fed into the standard wired terrestrial telephone system. In an instant, the phone in the Grove offices rang and Carol answered.

"Look out the window," said Bob and Carol waved at her boss at the picnic table — unaware that the phone call first went into and returned from orbit before arriving at her office, 50 feet away. This is the ultimate communications device. No matter where you are — on an arctic expedition for National Geographic, in a liferaft bobbing in the Pacific, under hostile fire from politicians at a Senate Subcommittee hearing, or at a

by Index Publishing, and is \$19.95 from the publisher (800-546-6707) or from Grove Enterprises (800-438-8155).

End TV Interference Now

If you're a ham or CB radio operator, you've probably had at least one visit from the neighbors, complaining about how your nasty (legal, licensed) radio interferes with their TV reception of Baywatch reruns.

You'd like to say, "tough luck; talk to the manufacturers of your TV," but you know that the next visit they'd make would be to their attorney. So here's the solution. MFJ is now making a new high pass TVI filter that they claim will suppress severe TV interference. The MFJ high pass TVI filter hooks between your cable and VCR or TV set and reduces TV interference from nearby radio transmitters. Wipe out TVI

coming from broadcast, commercial, two-way, amateur, and CB radios operating below 30 MHz!

The MFJ-711 uses a unique common-mode rejection (RF current on the shield of the coax cable) incorporating a toroid ferrite core. It has more than -60 dB attenuation on 10 MHz, more than -55 dB on 20 MHz and more than -40 dB on 30 MHz. Insertion loss is less than 0.5 dB at 52 to 550 MHz.

The whole thing is only a couple of inches and costs \$24.95. Best of all, if it doesn't work, MFJ wants you to send it back for a full "No Matter What" guarantee. That means that they will repair or replace your product with no questions asked. Isn't it worth \$24.95 to stop that pest coming over from next door, complaining about your radio? Order toll free at 800-647-1800 or write to them at P.O. Box 494, Mississippi State, MS 39762.

Grove FCC Database V6.0



It has been, admittedly, some time in the making, but the new enhanced Grove FCC Database v6.0 is now in stock! The Enhanced Grove FCC Database CD Rom is a "spectacular compendium" of all licensees in the FCC Master File. This includes all public safety, business, industrial, railroads, broadcasting, paging, maritime and much, much, more.

The new v6.0 allows you to sort through the information by city, service, state, latitude and longitude, callsign, name, even antenna height! The menu-driven program is fast and easy, even for fumbling computer users like myself.

The CD-ROM is available

from Grove Enterprises for \$99.96 plus \$4.00 shipping. If you have a copy of the old v4.1, you can trade it in for an upgrade for only \$49.95. To order or for more information, call Grove at 800-438-8155.

Logging Software



DXtreme has released a new Short Wave Reception Log, v 1.0. DXtreme's SWRL software is windows compatible and designed to provide casual and se-

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There are some well known CW/RTTY Decoders but then there is CODE-3. It's up to you to make the choice, but it will be easy once you see CODE-3. CODE-3 has an exclusive auto-classification module that tells YOU what you're listening to AND automatically sets you up to start decoding. No other decoder can do this on ALL the modes listed below - and most more expensive decoders have no means of identifying ANY received signals! Why spend more money for other decoders with FEWER features? CODE-3 works on any IBM-compatible computer with MS-DOS with at least 640kb of RAM, and a CGA monitor. CODE-3 includes software, a complete audio to digital FSK converter with built-in 115V ac power supply, and a RS-232 cable, ready to use.

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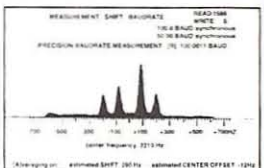
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- Duplex ARQ
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- TDM342/ARQ-M2/4
- FEC-A FEC100A/FEC101
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You can order the program via e-mail for just \$19.95, shipping included. You can also get a free

demo version of DXtreme's SWRL software on the World Wide Web. Their address is www.qth.com/dxtreme. You can e-mail them at dxtreme@ix.netcom.com. Mention MT when you write.

New PROBE for OptoScan

If you have one of Optoelectronics' great OptoScan 456, 456 Lite, and 535 computer-scanner interfaces, you'll want to check out PROBE's new version 3.0 software. The new version, says the manufacturer, "provides scanning features not found in any other OptoScan compatible software."

While there's far too much to be put in this short item, one of the most notable developments is the



introduction of Hyperbanks. With just one simple keystroke, you can immediately activate any combination of 99 scanning banks with each bank capable of storing up to 1,000 frequencies. Each of the ten available Hyperbanks can then be customized with a description so you can easily remember what each Hyperbank is designed to monitor. Other new features include Probe's unique Visual Alarms, Autotrack, and more.

You can order the new PROBE v3.0, complete with thorough printed documentation, from DataFile, Inc., for \$129.95 plus \$7.95 shipping and handling. Check, money order, Mastercard and Visa are all accepted. Orders can be sent to DataFile, Inc., P.O. Box 20111, St. Louis, MO 63123. You can also contact them by e-mail at datafiles@AOL.com. Mention MT when you call or write.

Books and equipment for announcement or review should be sent to "What's New?" c/o Monitoring Times, P.O. Box 98, 7540 Hwy 64 West, Brasstown, NC 28902 Press releases may be faxed to 704-837-2216 or e-mailed to mtditor@grove.net.

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Sony ICF-SW600 Midsize Portable

From the mid-Seventies until the mid-Eighties, shortwave radios varied in all kinds of ways. That's when the first pocket models appeared, and at the same time you could also buy portables as large as suitcases. It was an exciting time.

It was back then that I first began doing equipment reviews with International Broadcast Services (IBS). Technology was at a crossroads, with all sorts of innovation taking place. Some of those radios would look familiar today, but some were really different—the radio equivalent of “Stanley Steamers.”

There were traditional analog models, of course, and just like now they had coarse logarithmic frequency displays. But for a few glorious years, creativity blossomed as various firms tried to outdo each other designing receivers with accurate frequency readouts.

Such un-ergonomic models as the Sony ICF-5900W and Panasonic RF-2200 used gears, spinning wheels, and other mechanical contrivances to produce a fairly precise linear analog frequency readout ... *if* you could figure out how to make them work. A notch above these were the beloved, but short-lived, Wadley-loop models—South Africa's Barlow-Wadley XCR-30 and Japan's Yaesu FRG-7. These also were analog but, being electronic instead of mechanical, had accurate linear frequency readouts that were straightforward to use.

Someday, these “transitional models” will probably be collectors items just because they're so weird and uncommon.

Moving up the evolutionary ladder, there were analog models with built-in digital frequency counters, like the Panasonic RF-2600, RF-2900 and RF-4900. Finally, in 1980 Sony came out with the ICF-2001, the first digitally synthesized shortwave portable. Now, all really good models use that same synthesized design standard.

Technology has since settled into something of a rut, so most radios are pretty predictable. Of course, that's not always true—some high-priced tabletop receivers like the Watkins-Johnson HF-1000 and AOR AR-7030 are pretty innovative. But

The real kicker is that the audio quality of this \$60 radio is better than most models selling for \$100-400! That's because it has a decent-sized speaker and a continuous tone control, and you can really hear the difference.



there are some 600 million shortwave listeners worldwide, and less than a quarter million use tabletop communications receivers—that's one in every 2,400 listeners! For the sorts of portables nearly everybody uses, a certain boring “sameness” has crept in.

■ New Sony breaks pattern

Now, Sony has come out with a low-cost portable that breaks up the monotony to some extent. It's the ICF-SW600, a midsize analog portable that covers longwave, FM, mediumwave AM (but *only* to 1607 kHz), as well as nearly all world band channels. At under \$60 in the United States, it's tempting just because of price, but that's not the real story.

When you think of Sony world band receivers, what springs to mind is a portable with “brick” outboard AC adaptors that allow the radio to work without batteries. These radios are almost always made in Japan and, whatever their other virtues, they usually have pedestrian audio quality.

Actually, some Sony models don't even come with AC adaptors—you have to go out and buy your own. High-quality outboard AC adaptors that don't cause hum aren't cheap, and it's annoying when you pay \$200 for a radio to find that it doesn't have an ordinary AC adaptor.

But the SW600 turns all this on its head. To begin with, it's made in Malaysia, not Japan. But more important is that it comes standard with an AC power supply that's actually *built in*, the way it ought to be. This is real handy, even if it adds slightly to the

weight. The only rub is that it's not a universal power supply—120 VAC for units sold in the Americas, 225 Volts for units sold elsewhere.

■ Superior audio...for only Sixty Bucks

The real kicker, though, is that the audio quality of this \$60 radio is better than most models selling for \$100-400! That's because it has a decent-sized speaker and a continuous tone control, and you can really hear the difference.

Mind you, it's not great, just good. But it reminds me of when I was a kid and cut my shortwave teeth on tube-type receivers. Nearly all those radios had first-class audio circuits, and they often had large, manly speakers, to boot.

Bit by bit over the years we've gotten used to mediocre audio from tinny little speakers. Asian shortwave receiver designers often insist that because shortwave is low-fidelity, there's no point in spending money on better speakers, tone controls and the like.

These well-meaning theoreticians are living in ivory towers. Shortwave actually benefits greatly from a certain kind of high-quality sound: not wide-bandwidth high fidelity that reproduces squeaks only a dog can hear, but a sort of mellow tone plus clean midrange that simultaneously make for superior comprehension and pleasant listening. You don't need a Ph.D. in audio physics to tell this, just a pair of good ears.

That's one of the main reasons Grundig has succeeded so well in shortwave. Grundig radios don't necessarily sound great, but

they almost always sound more agreeable than the competition.

■ Limited features

The SW600 also has a nice retractable plastic handle, something else that has all but disappeared from shortwave portables in recent years. In fact, some Sangean portables don't have *any* handle—not even a cloth carrying strap.

But the SW600 doesn't have any of the features you'd expect to find on costlier models, such as a clock or dial light, and the radio won't demodulate single-sideband signals. It doesn't have an elevation panel or travel power lock, either, even though its on/off button is easily activated. Only a lone LED "glow light" is used to indicate signal strength.

Otherwise, it's your basic analog portable with a bandspread logarithmic dial that breaks down the various bands into discrete segments. The frequency readout isn't very accurate—good to maybe 30 kHz, or six channels—but that's typical for this type of receiver.

■ Performance okay, nothing more

Its performance is also about what you'd expect. It's reasonably sensitive to weak signals, but rejection of adjacent-channel signals is only fair. Because it's only single-conversion, image rejection is mediocre.

■ Unusual radio, attractive price ... while available

The bottom line is that this is a nice little radio for listening around the house, and occasionally on trips—especially if you don't change frequencies all that often. If you want to move it to the next room, all you do is unplug it and carry it off. It's just a nice, handy radio that's pleasant to listen to, and you can't beat the price.

The SW600 appears to be available in many parts of the world, but in the United States it hasn't been much of a seller. Alas, this means Sony of America is probably going to discontinue bringing it later this year. Maybe there just isn't a market for a radio like this, but more likely it's because in the United States they didn't target it to the usual shortwave market, but rather to AM/FM listeners who might buy it for hearing local stations, then see all those shortwave bands and decide to try tuning in the world.

Granted, any kind of analog shortwave radio is a pretty hard sell these days, even something like the Sony ICF-SW600. But it should sell nicely in less prosperous parts of the world, where it's almost ideal for listening hour after hour to stations like the BBC World Service.

But there are still many units in stock at Sony of America and its dealers, so there's a window of opportunity to lay hands on a new SW600—if you act soon!

■ New Receiver Book

Shortwave Receivers Past & Present is the straightforward name of an exceptional offering from veteran author Fred Osterman, who obviously prepared this as a labor of love—or borderline insanity. The large \$19.95 tome from Universal Radio Research (800/431-3939) covers over 500 models of tabletop receivers made between 1946 and 1996, with photos, basic specifications, market values and where to find reviews. Recently selected by *U.S. News & World Report* as a "Top Pick," this book is a "must" for any receiver nut's library!



This equipment review is performed independently by Lawrence Magne and his colleagues in accordance with the policies and procedures of International Broadcasting Services, Ltd. It is completely independent of the policies and procedures of Grove Enterprises, Inc., its advertisers and affiliated organizations.

RADIO DATABASE INTERNATIONAL WHITE PAPER® reports contain virtually everything found during exhaustive tests of premium shortwave receivers and outdoor antennas. For a complete list, please send a self-addressed stamped envelope to RDI White Papers, Box 300M, Penn's Park PA 18943 USA.

LONGWIRE BALUN

- Use coaxial cable from antenna to receiver.
- Low noise reception from 500 KHz to 30 MHz.

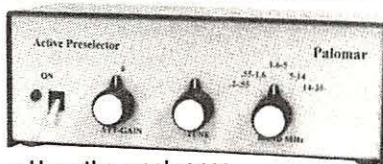


Your longwire may be up in the clear but the wire to the radio picks up noise from light dimmers, TV set, fluorescent lights, etc.

Coax shields out this noise but has far lower impedance than the antenna. Palomar's MLB-1 balun transforms the impedance to give a stronger quieter signal. Static charges go to ground, not through the radio.

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For 12vDC,

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RELM HS200 Portable Scanner

It's always welcome news when a new scanner is introduced. It's even better when another competitive company enters the scanner market, especially with an innovative product. That's what happened when RELM Communications introduced the new HS200 portable scanner, equipped with built-in CTCSS and DCS decoding.

RELM Communications, formerly Regency Electronics, isn't new to the radio business. Regency and Electra were the dominant FM monitor manufacturers in the USA during the 1970s and 80s. Regency sold out its scanner line to Uniden 10 years ago to concentrate on building two-way land mobile radios, but has now re-entered the scanner market.

■ The Basics

According to Bob Grove, the HS200 is made in Japan for RELM by Yupiteru. It tunes the conventional bands, including 800 MHz and civil aviation. Citizens Band is included, too (see measurements table). AM and NFM modes are automatically selected based on frequency and cannot be overridden. The aircraft band is covered in 25 kHz steps, versus 12.5 kHz steps found in other scanners.

The 200 memory channels are divided into 10 banks. Channels can be locked out from the scan list or cleared. The first channel of each bank is a priority channel which can be checked every 2 seconds. You can access a channel directly through the keypad or scroll through the channels by twisting a top mounted selector knob.

The HS200 key sequences follow in the tradition of older Regency programmables, like the M400. You program a memory channel by typing the frequency digits, then press Enter, then the channel number, followed again by Enter. You can stop there or use the keypad or selector knob to specify a CTCSS or DCS code. Pressing Enter stores the code in the current memory channel. A 2 second rescan delay can be enabled or disabled for all channels at the same time, not on a per-channel basis.

RELM claims a scan speed of "up to 100 channels/second," but we measured a rate of about 36 channels/second with a mixture of frequencies in different bands. Measuring the scan rate required extra effort and construction of an innovative test harness because the word SCAN appears on the display instead of a sequence of channel numbers or "rolling zeroes."

The HS200 supports one search bank with programmable limits. Up to 50 frequencies can be locked out during a search, but reprogramming either search limit erases the skip memories. We measured search rates of over 100 steps/second, regardless of step size. When placed in search mode, the DL/HL (delay/hold) key toggles between two settings: restart delay or search hold, which halts the search upon finding a signal. In the latter case, the channel selector knob can be used as a VFO tuning knob although the HS200 contains no VFO, per se.

■ Tone Squelch

The HS200 is the first portable scanner to include a tone squelch. CTCSS / DCS tone squelch is a great asset in areas where frequencies are shared by disparate users. If you know the code used by the system you want to monitor, you can program the proper code into memory and the HS200 will ignore signals on that frequency unless they are transmitted with the matching code. Our county sheriff uses the same frequency as the Chicago police, 60 miles away. We programmed the CTCSS code for our sheriff so we don't have to listen to Chicago during band openings.

Tone squelch is useful for federal scanning, too. Program a CTCSS code of 167.9 Hz into your FBI memories and you won't have to listen to digital voice scrambling. The agents only transmit with CTCSS while "in the clear." The HS200 tone squelch can be used while in manual mode or while scanning, but not while searching.

■ Getting Physical

RELM wisely designed this scanner to operate from AA penlight cells. The four cells can be alkaline or nickel cadmium, and a NiCd charging circuit is built inside the scanner. A 12 VDC power jack is located on the side of the case and a wall wart power supply is furnished. It can power the scanner while charging the NiCd batteries. According to our measurements, the HS200 consumes about 69 mA while scanning and searching. A battery saving feature reduces current drain to about 40 mA after 2 seconds of silence in manual mode.

The HS200 powers up doing the same task

it was doing when last powered off: scanning, searching, or in manual mode. Too bad more scanners don't behave this way. If you use the scanner as a monitor receiver in manual mode, it saves you the bother of taking the scanner off your belt and pressing the manual key each time you turn it on.

The HS200 liquid crystal display contains most of the information you would expect in a portable scanner, plus a 5 bar S-meter. The low contrast display makes viewing difficult unless held at the proper angle. The clear plastic lens is flush with the front panel, exposing it to more scrapes than a recessed lens would be.



Kudos to RELM for including a backlit keyboard. The lamp key illuminates both keyboard and display using green LEDs, which remain lit for 3 seconds unless another key is pressed. We wish the HS200 included a provision for leaving the lamps on.

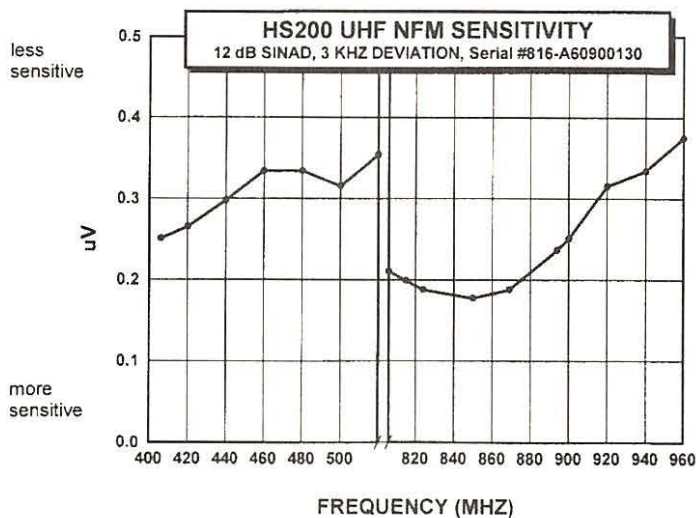
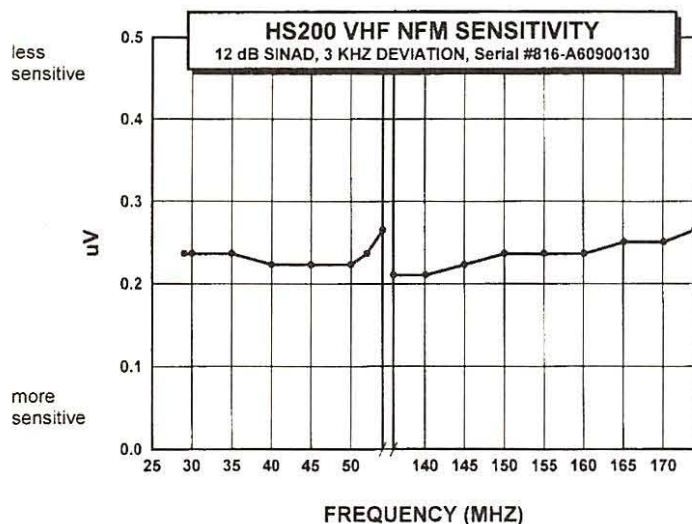
HS200 internal construction is noteworthy. Opening the plastic case reveals one printed circuit board for the keyboard/display circuitry. The rest of the radio is entirely shielded inside a metal box — quite different from the circuit board sandwich found in most portable scanners. The outstanding shielding pays off in reception quality free of wideband noise and few birdies.

The user manual did not specify the IFs (intermediate frequencies), so we found the local oscillator signals and deduced the IFs. The first IF appears to be 280.2 MHz and the last IF is 0.45 MHz. The high first IF and selective front end does a great job of rejecting images.

■ Does it Work?

Our HS200 proved sensitive both on the bench and in the field. We measured better than 0.3 μ V SINAD NFM sensitivity on most frequencies (see graphs). The HS200 was an excellent companion during December trips to busy shopping malls. The good sensitivity and fast search capability allowed us to find and monitor security and inside sales operations of several area stores while sitting inside a truck in the parking lot.

HS200 audio quality is a cut above most other portables we've tested lately. We mea-



sured about 200 mW of audio at the earphone jack, where it's probably attenuated to avoid hearing damage.

■ Excellent Value

We enjoyed using the RELM HS200. Fel-

low scanner club members were impressed with the tone decoding ability and offered to buy the evaluation unit before we were done testing it! The HS200 is not fancy but has three important strengths: CTCSS and DCS decoding, outstanding performance, and affordability. It is an excellent value at \$240 - \$250 street price. Welcome back, RELM!

■ BC9000XLT Labeling Tip

We reviewed the excellent Uniden/Bearcat BC9000XLT scanner in March 1995 *MT*. The ability to program an alpha label for up to 250 memory channels is one of its best features. The main tuning knob is used during the label programming procedure to scroll through a menu of all the possible letters, numbers, and symbols, and the Hold key is pressed to select the desired symbol.

You can save time by using the A - J and 0 - 9 keys to enter the corresponding symbols directly instead of fumbling with the main tuning knob to find the symbols in the menu. You can also use the "." key, but you must follow it by pressing the Hold or Auto key to advance the cursor.

See June 1996 *MT* for additional BC9000XLT tips and modifications.

■ Old Scanner Trivia

The mid 1970s vintage SBE-12SM Optiscan scanner used plastic cards for programming 10 channels. It was actually manufactured for Linear Systems by GRE (General Research Electronics of Tokyo), the same company which makes many of the Radio Shack scanners, including the venerable PRO-2006.

TABLE 1: Measurements,
Relm Communications HS200
Serial Number 816-A60900130

Frequency coverage (MHz):

26 - 28.995 in 5 kHz steps (AM)
29 - 54, in 5 kHz steps
118 - 136, in 25 kHz steps (AM)
136.005 - 174, in 5 kHz steps
406 - 520, in 12.5 kHz steps
806 - 824.0375, in 12.5 kHz steps
848.975 - 869.0375, in 12.5 kHz steps
893.975 - 960, in 12.5 kHz steps

FM sensitivity:

(12 dB SINAD, 1 kHz tone,
3 kHz deviation, see charts)
less than 0.4 uV

AM sensitivity:

(10 dB S+N/N, 1 kHz tone, 30%
modulation)
0.25 uV @ 27 MHz
0.24 - 0.27 uV @ 118 - 136 MHz

Intermediate Frequencies:

280.2 and 0.45 MHz

Practical scan rate (approx.):

36 channels/sec.

Search rate:

more than 100 steps/sec.

Audio output power (measured at

earphone jack):
approx 200 mW @ 10% distortion
into 8 ohm load

Current consumption at 6.0 VDC:

69 mA in scan, search, manual
40 mA (avg) in manual w/battery
saver
148 mA squelch open, full volume

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The Beverage Antenna: Excellent Directional Monitoring

Ever hear of Harold Beverage? He was a pioneer radio engineer who was instrumental in developing space-diversity receiving. Space diversity combats signal fading through the use of several antennas spaced far apart. As the signal fades out on one antenna, the system automatically seeks another antenna with a stronger signal, and overall fading at the receiver's audio output is much reduced.

Actually, Beverage is remembered these days primarily for an antenna that he designed which is sometimes called a "wave" antenna, but more often simply known as the "Beverage." This antenna is one of the best directional receiving antennas ever, very wideband in its response.

Although it requires a few hundred feet (to a few miles!) of wire to put it up, don't give up if you have only a small lot. You can still put up a Beverage—or the shorter version described below—when on a vacation to the countryside, and enjoy some real DXing. It only takes a few

minutes to erect if you have all the parts ready. And, because it is only 12 to 15 ft high, it is an easy one-person job. Sorry, but a Beverage won't work as well on the beach; this antenna needs relatively dry soil to function properly.

The basic Beverage is bidirectional, but can be made unidirectional with the addition of a terminating resistor (fig. 1). It has very low gain, and yet gives excellent results because of its high signal-to-noise ratio (S/N). That is, it ignores interference and noise from all but its favored direction(s), and, of course, responds maximally to signals from its favored direction(s). It is a good performer from LF on through the lower end of the HF band, sometimes as high as 5 or even 10 MHz.

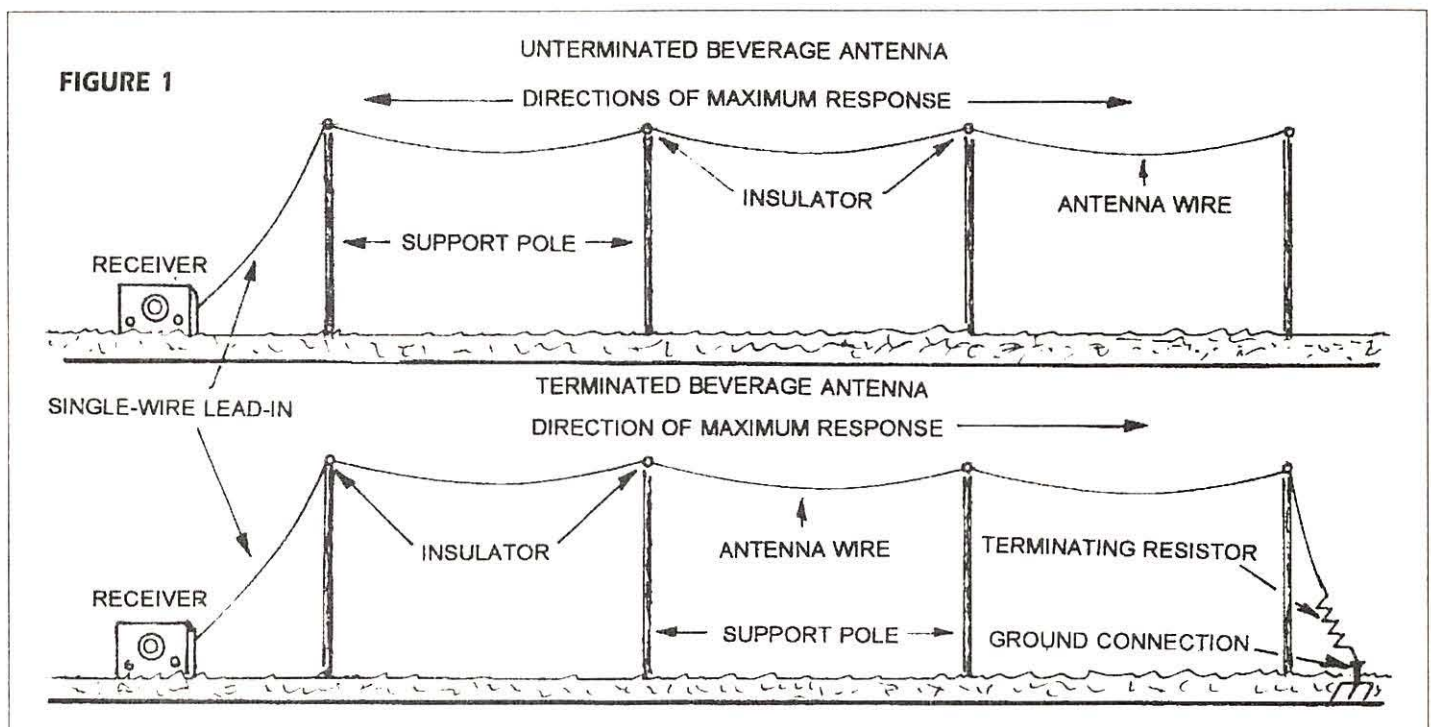
A Beverage receiving antenna was used by Paul Godley many decades ago in Scotland to log the first trans-Atlantic ham radio communications. BCB DXers find the Beverage an outstanding antenna to bring in that station covered up by other stations on the same frequency. Hams use it on the 160 meter band to

dig weak signals out of the horrendous noise for which that band is famous.

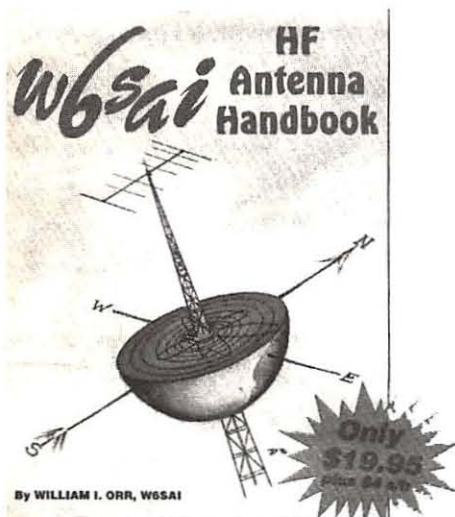
■ Making Your Beverage

Beverage's original wave antenna was two miles long, and one he later built for RCA was six miles long! Most are not so long as that, although to qualify as a real Beverage the antenna should be at least one wavelength long at its operating frequency. A wavelength at 3 MHz is over 300 feet long, and a wavelength at 500 kHz is almost 2000 feet long. Nevertheless, I used a Beverage configuration with a wire only 200 feet long on the AM broadcast band with excellent results. Maybe it wasn't a real Beverage, but it had the high directivity and excellent S/N which I had hoped for.

To make yours, just string the wire over tree branches, bushes, or poles in the direction of the station you want to receive. Just about any wire is OK; it should be insulated from its supports, and elevated 10 to 15 feet above the ground. Make it relatively straight, and *as long as you*



Two configurations of the basic Beverage-antenna design.



can make it. Because the antenna is very directive be sure that the far end (the end opposite the end to which the receiver is connected) really points toward the station you want to hear.

The antenna can be made unidirectional by adding a terminating resistor of 400 to 600 ohms as shown in figure 1. The resistor should be non-inductive (i.e., carbon, not wirewound), and can be adjusted in value for maximum rejection of signals in the suppressed direction by adjusting its resistance during listening tests.

There are variations on the Beverage design; one that could be of considerable interest to monitoring buffs is the two-wire beverage with steerable-null capabilities as covered in the 17th edition of the *ARRL Antenna Book*.

■ An Excellent New Antenna Book

I've mentioned Bill Orr's excellent series of antenna books before, especially the Orr and Cowan *Antenna Handbook*. These books are hard to beat for down-to-earth information and advice on a wide variety of antennas. Orr's latest, the *W6SAI HF Antenna Handbook*, will be of interest to persons interested in antennas in general, and particularly to the hams among us. The book is based primarily on his past (and popular) monthly column in *CQ Magazine*.

He has reworked and added to this material, and arranged it into chapters on such topics as feedlines, single wire antennas, multiband dipoles, transmitting and receiving loops, 160-meter antennas, and beam antennas. Also included is material on such important topics as ground loss, antenna height, radiation resistance, antenna instrumentation, tuners, baluns, and the use of antenna analysis computer programs. A feature of interest to those who know Orr through his writings, is a short biographical sketch of his experiences in radio.

Packed with wisdom gleaned in his long and continuing career in radio, this book will make a great addition to your antenna library. You

don't have an antenna library? Shame on you! Start one with the Orr and Cowan *Antenna Handbook* mentioned above, and add Orr's new handbook in the near future. They're available from CQ Communications, 76 N. Broadway, Hicksville, NY 11801; (800) 853-9797.

RADIO RIDDLES

■ Last Month:

I asked: "Why ... is it usually useful to increase the strength of received VHF or higher frequency signals by making a receiving antenna resonant, but often not useful at HF or lower frequencies?" I also gave the hint that HF and lower frequencies usually have more received noise than VHF or higher frequencies. Let's see what this has to do with it.

Because there is usually a high received-noise level on the HF band and the lower frequencies, the signal which you want to receive can get buried in the noise and interference found there. As a matter of fact there is usually much more received noise on HF than there is noise generated in your HF-receiver circuits. Thus received noise is the noise of concern in determining the signal to noise (S/N) ratio.

Received noise is a genuine radio signal just as much as is the signal you want to hear. So, because both the desired signal and the received noise are increased to the same extent by making the antenna resonant, the S/N is not improved. Reception quality remains essentially the same even with the higher signal output from the resonant antenna.

Contrary to the situation on HF, at VHF and higher frequencies there is little received noise. With a very low received-noise level, the noise generated within the receiver circuits becomes the noise of concern in determining the S/N. Making an antenna resonant does not affect the level of receiver-generated noise. So increasing the desired-signal strength by making the antenna resonant raises the desired-signal level in

relation to the receiver-generated noise, and the S/N improves. This, of course, improves reception.

■ This Month:

Speaking of resonant antennas, how many non-resonant antenna designs can you name? Hint A: Don't include "dipole," "groundplane," or "Yagi-Uda" in your choices. Hint B: If an antenna isn't resonant, will it likely be broad, or will it be narrow in its bandwidth? Hint C: Don't include "log-periodic array" in your choices.

You'll find an answer for this month's riddle, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.

Request for information: Can anyone give me a definition of an "irrational beam," or better yet, the source of some references to this term? If so please drop me a line at MT.

Note on advertisement below: As of 4/26/94 it became unlawful to market cellular-capable receivers in the US. Atlantic Ham Radio assures us that it will give a full refund and hold customers harmless from shipping expenses if a purchased unit is returned to the vendor by US Customs.

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Apr 4-5	Albertville, AL	Marshall County ARC / Buddy Smith, KC4URL, 205-593-2516
Apr 4-5	Atlanta, GA	SE VHF Society / Tad Danley, K3TD, 770-513-9252, k3td@amsat.org. / Location: Atlanta Marriott NW Windy Hill. Jimmy Treybig, W6JKV. Sat banquet speaker: founder Tandem Computers and expert on 50 MHz prop. Reg \$35, banquet \$30. Int'l DX Conv / Marilyn Bagshaw, N6VAW, 94 Lovell Ave., Mill Valley, CA 94941
Apr 4-6	Fresno, CA	Longmont ARC / Jim Deeming, KB0MED, 303-651-7764
Apr 5	Longmont, CO	Radio Amateur Society of Norwich / Mark Venable, N1RSK, 860-572-9380
Apr 5	Waterford, CT	Columbus ARC / Marion Winterberg, WD9HTN, 812-342-4670
Apr 5	Columbus, IN	N. Co. ARC & LARK / Richard Force, WB1ASL, 603-788-2202
Apr 5	Twin Mountain, NH	Lawton Ft. Sill ARC / Bob Morford, KA5YED, 405-353-8074
Apr 5	Lawton, OK	Aiken Contest Club / Doug Glass, AC4WW, 803-648-4754
Apr 5	Aiken, SC	Maryland State Convention / William Dobson, N3WD, 410-HAM-FEST
Apr 5-6	Timonium, MD	Livermore ARK / Noel Ankam, KC6QZK, 510-447-3857
Apr 6	Livermore, CA	Denison Repeater Association / John Amdor, KD6MXL, E-mail: johnmxl@netins.net
Apr 6	Deloit, IA	Framingham ARA / Martin Bayes, AA1ON, 508-435-0564
Apr 6	Framingham, MA	Tupelo ARC & Booneville ARC / Jack Ellis, K15QV, 601-842-7255
Apr 11-12	Tupelo, MS	Kentucky Colonels ARC / Leon Garrett, K4CIT, 502-842-5307
Apr 12	Bowling Green, KY	Portland Amateur Wireless Assn. / Ronald Levere, KA1FI, 207-846-9090
Apr 12	Portland, ME	Rochester ARC / John Scott, N0HZN, 507-732-5091
Apr 12	Rochester, MN	Appalachian ARG / AARG, 717-345-3780, or Lanny Hoffman, KD3TS, 717-274-2148. / Location: Northern Lebanon High School, Fredericksburg, PA. Talk-in 146.04/64. 8am - ? \$4 admission.
Apr 12	Lebanon, PA	Utah State Convention / Kathy Rudnicki, N7JSH, 801-547-9218
Apr 12	Ogden, UT	Six Meter AR Team / Buddy Travis, KA4NNN, 540-894-0406
Apr 12-13	Goochland, VA	South Atlanta Ham and Computer Festival / Tim Vogle, WB4ZMR, 770-593-3962
Apr 12-13	Atlanta, GA	Southington ARA / H. Chet Bacon, KA1ILH, 860-628-9346
Apr 13	Southington, CT	Raleigh ARS / Chuck Littlewood, K4HF, 919-872-6555
Apr 13	Raleigh, NC	Teays ARC / Roy Ulko, KG8EK, 614-477-8310
Apr 13	Circleville, OH	Columbia-Montour ARC / Dave Schack, WC3A, 717-752-6851
Apr 13	Bloomsburg, PA	Madison Area Repeater Association / Jim Waldorf, KB9AQQ, 608-245-8890
Apr 13	Madison, WI	Central Arkansas Radio Emergency Net / J. C. Smith, N5RXS, 501-568-7982
Apr 18-19	Little Rock, AR	West Island ARC / Mark Hillier, VE2HVV, 514-485-1663, E-mail: Fleamarket@WIARC.HVWtech.com
Apr 19	Montreal, Canada	Central Georgia ARC / Charles Armstrong, AE4VA, 912-328-0935
Apr 19	Warner Robins, GA	Lewis/Clark, Clearwater Valley, & Camas Prairie ARCs / Doug Graham, KB7RKY, E-mail: yvette@clearwater.net
Apr 19	Lewiston, ID	Trojan ARC / Jim Robison, KG0PI, 913-462-6436
Apr 19	Colby, KS	Lake Region ARC / William Morgan, AA0AX, 218-736-4448
Apr 19	Fergus Falls, MN	Joplin ARC / Andy Gabbert, KA0TUD, 417-673-8371
Apr 19	Joplin, MO	Gastonia Area ARC / Joey Ferguson, W4JF, 803-372-4373 or 803-328-2936
Apr 19	Gastonia, NC	Temple ARC / Mike LeFan, WA5EQQ, 817-773-3590
Apr 19-20	Belton, TX	Birmingham ARC / Ellis Dobbins, K4LI, 205-798-3459 or 205-970-0737, Fax: 205-970-0622
Apr 19-20	Birmingham, AL	Delaware State Convention / Hal Frantz, KA3TWG, 302-798-7270, Fax: 302-798-8516
Apr 20	New Castle, DE	MIT RS & Harvard Wireless Club / Steve Finberg, W1GSL, or Nick Altemburnd, KA1MQX, 617-253-3776
Apr 20	Cambridge, MA	Southeast Michigan ARA / Steve Semrau, KA8UHG, 810-296-5874
Apr 20	Grosse Pointe Woods, MI	Blossomland ARA / Al Rea, W8LRM, 616-983-6052
Apr 20	St. Joseph, MI	Ak-Sar-Ben ARC / Auction / Mary Joseph, N0TRK, 402-492-9156
Apr 20	Omaha, NE	Twenty Over Nine RC / Donald Stoddard, N8LNE, 330-793-7072
Apr 20	Canfield, OH	Delta Division Convention / Jim Blackmon, KB5IFV, 501-246-7833, Fax: 501-246-6736
Apr 25-26	Little Rock, AR	Iowa State Convention / Mike Nickolaus, NF0N, 402-494-6070
Apr 25-26	South Sioux City, NE	Valley of the Moon ARC / Darrel Jones, WD6BOR, 707-996-4494
Apr 26	Sonoma, CA	North Shore & South Pickering ARCs / Ian Smith, VE3ITG, 905-427-4873, Fax: 905-686-8522, E-mail: ismith@globalserve.net
Apr 26	Pickering, Ontario, Canada	Cherryville Repeater Assn. / Charlie Kosman, WB2NQV, 908-788-4080
Apr 26	Belvidere, NJ	Albuquerque ARC & AR Caravan Club / Chuck Opdyke, KC5GA, 505-858-0306
Apr 26	Albuquerque, NM	Umpqua Valley ARC / Ed Pahl, W5PII, 541-673-1310
Apr 26	Roseburg, OR	Washington County & Fidelity ARCs / Bill May, WA1WM, 401-822-0520
Apr 26	West Greenwich, RI	Clark County ARC / Wayne Schuler, A19Q, 360-896-8909
Apr 26	Vancouver, WA	Pioneer ARC / Ed Messenger, N8OYY, 304-462-5312
Apr 26	Flatwoods, WV	Moultrie ARK / Ralph Zancha, WC9V, 217-873-5287
Apr 27	Arthur, IL	Southwest Metro AR Transmitting Society / Audrey Zellman, N0OKX, 612-466-5852
Apr 27	Shakopee, MN	Mt Beacon Hamfest, E NY Conv / Ken Akasofu KL7 JQC, 914-485-9617, -2402 fax, Ken Akasofu@bbs.mhv.net. / Location: John Jay High School, exit #15 off Rte 84, 8am-1pm. Talk-in 146.97, \$10 adm.
Apr 27	Fishkill, NY	Athens County ARA / John Cornwell, NC8V, 614-593-6474
Apr 27	Athens, OH	

Send announcements of events or club information to: Editor, Monitoring Times, P.O. Box 98, Brassstown, NC 28902-0098. Fax 704-837-2216; e-mail mteditor@grove.net. See MT's homepage on www.grove.net for complete event and club listings.

North American Club Listings P - V

New Listing

Delaware Co (PA) Emergency Radio Club:

Dave Donohue, (610) 493-0292, DDONOHUE@bigfoot.com. Scanning public safety in Delaware, Phila, Buck, Chester counties. Monthly mtgs and online newsletter. www.tripod.com/~ddonohue/DCERC.HTM - \$5 dues.

Pitt Co SW/Scanner Listeners Club: L. Neal Sumrell, P.O. Box 1818, Winterville, NC 28590-1818. Eastern NC; All bands. *The DX Listener*. Irregular meetings.

Puna DX Club: Jerry Witham, P.O. Box 596, Keaau, HI 96749, (808) 982-9444; Puna, HI; SW and MW. Meet 1st Tuesdays. No dues.

Radio Monitors of Maryland: Ron Bruckman, P.O. Box 394, Hampstead, MD 21074.

Maryland, (410) 239-7366; VHF/UHF/HF utilities. *Radio Monitors Newsletter of MD*.

Meet irregularly. <http://arrowweb.com/RMM>

Regional Communications Network (RCN):

Jay Delgado, Box 83-M, Carlstadt, NJ 07072-0083. 50 mile radius of NY City; a hobbyist group dedicated to information and resources on rf-telecommunications technology and broadcasting worldwide. #10 SASE for info.

Rocky Mountain Radio Listeners: Mike Curta, P.O. Box 470776, Aurora, CO 80047-0776. Metro Denver, Colorado. All bands. Meets monthly 2nd or 3rd Sundays 1-4pm, Aurora Central Library.

Sandy River SW Radio DXers Assoc:

Duncan or Brenda Steele, R.R. 1, P.O. Box 1560, Norridgewock, ME 04957. Worldwide. *The QSL* - irregular. No dues.

Scanning Wisconsin: Ken Bitter, Dept. MT, S. 67 W. 17912 Pearl Dr., Muskego, WI 53150-9608, (414) 679-9442. Wisconsin. VHF/UHF. *Scanning Wisconsin* (\$2 for sample)

Signal Surfer DX Club: Darcy Jabs, RR2, Burns Lake, BC, Canada, V0J 1E0; (250) 694-3760. www.angelfire.com/ak/SWL/index.html. Canada and worldwide. MW and SW DXing.

Southern California Area DXers (S.C.A.D.S.): Don R. Schmidt, 3809 Rose Ave., Long Beach, CA 90807-4334, (310) 424-4634. California area; AM, FM, TV, scanner and shortwave broadcasting.

Susquehanna Co Scanner Club: Alan D. Grick, P.O. Box 23, Prospect St., Montrose, PA 18801-0023. PA area; Scanning. Meets irregularly.

Toledo Area Radio Enthusiasts: Ernie Dellinger, N8PFA, 6629 Sue Lane, Maumee, OH 43537. NW Ohio and SE Michigan; Shortwave, scanning, amateur. Meets 3rd Thursdays 7pm Holland Big Boy.

Triangle Area Scanner/SW Listening Group:

Curt Phillips, KD4YU, P.O. Box 28587, Raleigh, NC 27611. Central NC.

Vancouver Shortwave Association (previously British Columbia Shortwave Listening Club): Box 500, 2245 Eton St., Vancouver, BC Canada V5L 1C9, (604) 255-8987 fax. Shortwave. *LOGJAM*. Meets 3rd Thurs. 7pm at 920 Davie St.

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MORE ON SCANNER HUM

In our February issue, we tackled possible answers as to why a listener received a hum on some scanner frequencies, but not on others, and then only when a signal was present. We missed the most obvious answer sent in by several sharp-eyed readers.

Most agencies utilize continuous tone controlled squelch (CTCSS), sometimes called subaudible tone, or by GE's trademarked "PL" (Private Line). So long as the squelch-activating tone is low enough, it isn't audible, but when a tone is used that is near the speech range, it is quite prevalent, especially when the amplitude of the tone is turned up to assure squelch activation.

Most embarrassing is the fact that I often hear this hum on my own scanner from local law enforcement agencies! I guess I have grown tolerant of it.

Q. Is there such a thing as a HAARP detector? (Angus Ashdown, Lexington, KY)

A. Yes, it's called a shortwave receiver. Signals generated by the controversial High Frequency Active Auroral Research Program (HAARP) in Gakona, Alaska, are no different from other shortwave broadcasting facilities, except the power is concentrated upward in an attempt to modify the ionosphere to enhance radio communications and surveillance systems for both the military and civilian sectors.

HAARP is managed jointly by the U.S. Air Force and Navy and, at present, runs 340 kilowatts of power. Eventually, 180 antenna elements will concentrate a beam of 3.6 megawatts. A system test was announced for March 8, 1997, between 0430 and 0500 UTC on 6.99 and 3.4 MHz. A CW message was prepared primarily for reception by Alaskan hams.

The HAARP home page may be visited at <http://server5550.itd.nrl.navy.mil/announce.html>

Q. When I plug an external, amplified speaker into Sony ICF-2010 receiver, I get AC hum, and also feel an electrical "buzz" on my hand when I touch metal parts of

the system. What can I do to eliminate these undesirable effects? (Bill Fusfield)

A. Undoubtedly, you are using an AC wall adaptor with the audio system. Try reversing the prongs of the adaptor in the wall plug; the sound and the sensation should go away. If it doesn't, replace the adaptor, or use battery power on the amplifier.

You can also protect yourself from shock, and possibly eliminate the hum as well, by grounding the speaker system. Connect a wire from one of the "hot" metal parts of the speaker to the third-wire (round) grounding pin on the wall receptacle.

The danger in this is that if the AC adaptor is defective, excessive current could flow, causing a fire. It should be relatively easy to avoid this, however, by observing whether there is a visible spark when you connect the grounding wire, and whether the adaptor or power cord overheats after a few minutes of operation.

Q. I am experiencing a strange interference on my old Bearcat 210XLT scanner. When I monitor

Bob's Tip of the Month

Many listeners are thwarted by zoning covenants from erecting effective outdoor antennas, both for shortwave and scanner use. While indoor antennas are still a viable alternative, there are some cases where antenna-like utilities are already in place and may be called upon for "quick and dirty" reception.

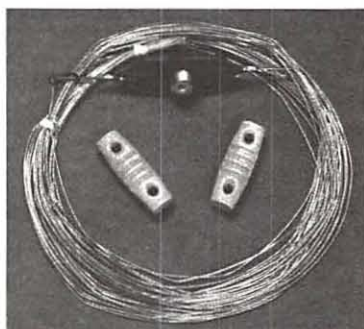
Air conditioning ducts can make excellent shortwave antennas, and may even work for local scanner reception as well. For shortwave listening, simply run a small wire from the antenna of the radio (or the antenna jack) to the duct's vent screw. For a scanner, you must use a length of coaxial cable from a conventional connector at the scanner, but

connected just by the center wire to the screw. The popular Grove "NoTenna" (ANT-20) works well for this approach.

Other household "antennas" include an abandoned telephone cable, bedsprings, aluminum window and door frames, metal pipes or conduit, heating ducts, rain gutters, downspouts, fire escapes, and other sizable metallic structures.

It is even possible to connect an antenna to a telephone line by using a series blocking capacitor between the receiver and the make-

Makeshift Antennas



shift antenna to prevent "loading" the line, or allowing the telephone operating voltage to access the radio's delicate input circuitry. A capacitor of approximately .001 microfarads, 600 working volts, will work just fine.

While it may be tempting to use this same scheme to hook into the AC house wiring, it is safer to connect to the third wire ground (round) terminal; the reception will be the same.

our local police frequency, 460.125 MHz, I hear telephone conversations until there is a police transmission. Other model scanners in different part of the house don't receive it. What causes it? (Marian Alley, Rochester, NY)

A. Good question! If you have plugged other scanners into the same antenna you are using for the Bearcat and don't hear it, the problem is with that scanner; it won't be a harmonic from the cordless or cellular telephone. Chances are you are experiencing intermodulation or imaging produced by the scanner's mixing of the legitimate telephone frequency with another

strong, local signal, producing the resultant frequency on 460.125 MHz. The strong signal could be a broadcaster, pager, or even an internally-generated harmonic of the scanner's oscillator circuitry.

The easiest fix is to swap this scanner with another one in your home and see if the interference disappears at the scanner's new location.

Q. How costly is it to run a short-wave broadcasting transmitter? (Ron Hunsicker, Wyomissing, PA)

A. Ron answered his own question after doing some research. For a 500 kilowatt transmitter running about 33% efficiency (probably close to accurate) at a nickel per kilowatt-hour, that transmitter consumes \$75 worth of electricity every hour, \$1800 per day, or \$657,000 per year!

Q. Why don't shortwave portables, like handheld scanners, come with internally-rechargeable batteries? (Brian Limbach, Sewickley, PA)

A. Probably because there is no demand for that capability. It seems convenient, but every feature adds cost, and most shortwave portables are tightly cost-competitive. Consider the listening habits, too: while handheld scanners are often called on for many hours of continuous service, most shortwave portables are used for casual listening. And like desktop scanners, shortwave radios used for long-term listening are connected to power lines. Carrying a portable shortwave radio around and listening to it for hours on end is very unusual.

Q. How long can a scanner stay on continuously until it fails? (Michael Denney, Carrollton, GA)

A. Like so many other consumer products, it depends upon how well it is made, and under what conditions it is operating. Mobile and hand-held scanners fail earlier than desktop scanners due to their vulnerability to rough handling and vibration, temperature extremes, and dust. Other factors include how often the keys are pressed, knobs turned, and whether the radio is in a salty or corrosive environment. Short-term burnout can result from nearby lightning strikes or high powered transmitters.

If the scanner is in a clean, well ventilated environment, and is not constantly being programmed or adjusted for squelch and volume, it should last for several years. At Grove Enterprises, we commonly see trade-ins still in excellent condition after 10 or more years of use.

Questions or tips sent to "Ask Bob," c/o MT are printed in this column as space permits. If you desire a prompt, personal reply, mail your questions along with a self-addressed stamped envelope (no telephone calls, please) in care of MT, or e-mail to bob@grove.net. (Please include your name and address.) The current "Ask Bob" is now online at our WWW site: www.grove.net

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1296 MHz FM. I'm interested in corresponding with hams active on this band and mode. Mark KB4CVN, 341 County Road 852, Ft. Payne, AL 35967-5740.

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(LETTERS ... Continued from page 4)

Response from Jay Quinby

"Broadly painting a large group, many of whom use radios as tools with which to enjoy other hobbies (such as aviation, auto racing, model railroads and others), as a group of largely perverted wastes of human potential only underscores a basic unwillingness on your part to explore the total issue.

"By latching onto the hysteria *du jour*, you've fallen victim to the basic sensationalism of the mainstream media. Simply adding your voice to an already misdirected sea of noise does virtually nothing and thus, you have failed to either

shed any new light on the topic or create anything of value for the public discourse. Rather, you've kicked today's dog. Tomorrow, I'd expect you to be kicking another."

Response from D.B. (Bruce) Dixon, Canada

"Is it a 'shameful waste' to want to be on top of the situation before I get a page from our fire dispatcher? Or to want to know what the highway conditions are like before I take our ambulance out of the hall to go and save someone's life on the highway? Or to listen to our Provincial Police Department to know what I can

expect on the nights I am on call?

"The bottom line, Mr. Stolz, is that what is put into the airwaves is essentially 'in the public domain,' and those of us who 'choose to entertain themselves by listening to the hellscat of human voice bouncing across the radio spectrum' are often performing a vital public service.

"Spend a busy night with a volunteer Fire/Rescue Squad, and then re-write your column."

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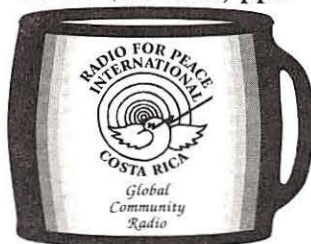
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By Bob Grove,
Publisher

Cell Phones and the Right to Privacy: A Commentary

*The text of Bob Grove's opening statement to the House
Telecommunications Subcommittee
Wednesday, February 5, 1997*

Technically unsophisticated Americans are astounded, and often outraged, upon learning that their cellular telephone conversations are broadcast openly, and that anyone with a variety of receiving devices can listen in. They don't blame the listeners as much as the vendors who sold them the phone with no warning from the salesperson or in the instruction manual. To the contrary, irate customers report being reassured that privacy is not a problem because it is illegal to listen in, modern scanners don't have cellular frequencies, and that frequencies keep switching among over 800 channels, making following a conversation nearly impossible.

Scanner owners and other citizens agree that Americans deserve a reasonable expectation of privacy, but broadcasting a clear voice into the airwaves and expecting it not to be overheard is not reasonable. They see the analogy of walking down a crowded street naked and expecting no one to look, or talking openly in a crowded room and expecting no one to hear.

They feel that the responsibility of security should not be placed on the shoulders of the scanner hobbyist, but on the service provider, just as it has always been on wired telephone services, and all other radio communications services, including law enforcement and even cordless telephone manufacturers.

With the Cellular Telecommunications Industry Association (CTIA) an ever-present specter behind the drafting of repressive listening legislation, the cognizant public perceives the Electronic Communications Privacy Act (ECPA) as a fiscal expedient of the CTIA, lobbied into law to provide a no-cost alternative to offering their customers real privacy, and endlessly blaming the harmless hobbyist for listening to his scanner. Public suspicion is heightened when they learn that these restrictive regulations are added on as eleventh-hour amendments with little or no time for legislative reflection or a public comment, or when hearings such as this one invite their representation at the last minute with virtually no time for preparation.

Americans resent government repression of their rights, and freedom of the airwaves has been traditional for decades. But over the last decade, this freedom appears to have been eroded by the multi-billion-dollar cellular telephone lobby for their profit advantage. The ECPA (Electronic Communications Privacy Act) and the subsequent Cellular Amendment to the TDDRA (Telephone Disclosure and Dispute Resolution Act) have singularly imposed, for the first time, listening restrictions in the United States which are more severe than in Canada and some other developed countries.

Among the estimated 10-20 million scanner owners in the United States, flagrant violations are extremely rare, certainly far fewer than among gun owners, and scanners don't kill, yet a hefty fine and lengthy jail sentence await the hapless scanner listener who merely tunes in on an anonymous telephone conversation. The general impression by the wary public is that even this hearing may be a facade orchestrated by the cellular industry to impose further restrictions on the general public, thus perpetuating the illusion of privacy, rather than adopting existing technology to provide real privacy to their trusting customers.

If cellular telephone conversations were digitized as long promised by the cellular industry, all of these hearings, charges and countercharges, legislation and regulations, indictments and fines, and costly policing of the cellular frequencies—all at the taxpayers' expense—would be unnecessary. All restrictive laws pertaining to scanner frequency coverage and cellular eavesdropping could be rescinded. No one could hear the conversations. The traditional American freedom of access to the airwaves could be restored.

The public perception of Congress as a shopping mall for big business can be largely corrected by this group of legislators. Instead of indicting citizens for listening to their radios, or vilifying small businesses who flounder in the quagmire of ambiguous and ineffectual rules and regulations, face the industry. Tell the millions of scanner owners now watching, that the only way to insure privacy on cellular telephones is to implement the inexpensive, effective technology promised many years ago; the same low cost, high level privacy offered by other communications services.

In last month's column we mentioned the Optoelectronics Xplorer as a cellular-capable test receiver, but failed to point out that the full-coverage version has only been made available to qualified agencies. The consumer version has always been cellular-blocked.

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